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58-D Paul Drive,
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94903-2054
415/479-5819
www.practicalwinery.com

PUBLISHER
EDITOR
Don Neel

ASSOCIATE
PUBLISHER
Tina Vierra

SENIOR
EDITOR
Carol Caldwell-Ewart

PUBLISHER'S
ASSISTANT
Johanna Rupp

ART DIRECTOR
Terry Lockman
Lumina Designworks

CONTRIBUTING
EDITORS
Eleanor Heald
Ray Heald
Michael Terrien
Ed Weber
Bruce Zoecklein

CONTRIBUTING
WRITERS
Jack Heeger
Millie Howie
Craig Root
Dr. Richard Smart

ADVERTISING
REPRESENTATIVES
Wettstein, Nowell
& Johnson, Inc.
Leslie Chase
707/765-2546

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# PRACTICAL WINERY & VINEYARD

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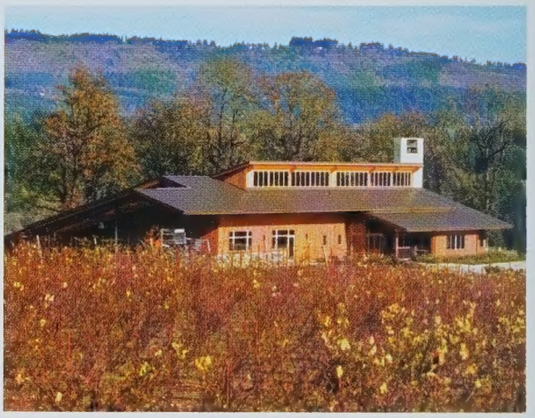

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**Cover photo: Penner-Ash Wine Cellars, Newberg, OR. Photo by Ron Penner-Ash**

*"To stimulate continuing improvement in the wine industry."*

RUNNING HOT AND COLD

# Grapegrowing and winemaking in contrasting climates

BY Brian Croser,
Tapanappa Wines PL,
Piccadilly Valley, South Australia

Edited from a presentation to International Cool Climate Symposium, February 2006, Christchurch, New Zealand

Is there a difference in the way grapes should be grown and wine made in warm and cool climates? Based on my 35 years of experience with grapes and wines from different climates and in making wines of different styles, including sparkling wines, what are some of the key components of the growing and winemaking processes that are different when dealing with warm or cool regions?

The Clare Valley (South Australia) is the warmest viticultural region in which I have grown grapes and made wine. I have made 26 vintages of Riesling from the Hanlin Hill Vineyard in that region.

The climatic index of Richard Smart and Peter Dry (1980) defines a "hot" viticultural region as having a Mean January Temperature (MJT) of between 21.0°C [70°F] and 22.9°C [73°F]. By that definition, Clare qualifies as a "hot" viticultural region with a MJT of 21.45°C [71°F]. Heat summation above 10°C [50°F] for Clare is 1737°C [3159°F] days and puts Clare firmly in Region 3 (1667–1944°C [3033°–3531°F] days) defined by Maynard Amerine and A.J. Winkler.

Piccadilly Valley in the Adelaide Hills (South Australia) is the coolest region in which I have grown grapes and made wine. It has an MJT of 18.2°C [65°F] and a heat summation of 1171.6°C [2141°F] days — clearly "cool" by the Smart and Dry definition and a Region 1 by Amerine and Winkler's measures. I have grown grapes and made wine in the Piccadilly Valley for 27 years (22 vintages)

Piccadilly Valley is marginally cooler than Portland, OR, which approximates the nearby Willamette Valley and has an MJT (Mean July Temperature) of 19.2°C [67°F] and a heat summation of 1191°C [2176°F] days. I founded and have been associated with Argyle Winery in the Willamette Valley for 20 years.

Pinot Noir and Chardonnay varieties are important in both these regions for table and sparkling wine production.

In between these extremes, I have made wine from:

- Wrattonbully (Struan, South Australia) — MJT 19.1°C [66°F]; heat summation 1472°C [2682°F] days; varieties Cabernet Sauvignon and Shiraz; four vintages (1980, 2003, 2004, 2005)
- Mt. Barker (South Australia) — MJT 19.4°C [67°F]; heat summation 1419.2°C [2587°F]; varieties Shiraz and Viognier; 10 vintages.
- Coonawarra — MJT 18.9°C [66°F]; heat summation 1375.6°C [2508°F] days; varieties Cabernet Sauvignon and Merlot; 26 vintages.
- Parawa (Fleurieu Peninsula, South Australia) — MJT 17.9°C [64°F]; heat summation 1196.7°C [2186°F] days; variety Pinot Noir; first vintage due in 2006.

I can only report that my belief, as a result of this varied experience, is that the heat in any fine wine region only indirectly dictates viticultural practices and winemaking methods through its influence on the choice of grape varieties and hence wine style.

Regional and vintage variations of growing season heat do not fundamentally trigger adjustments to viticultural or winemaking practices in the fine wine regions where I have had experience. The chosen varieties and wine styles much more directly influence the viticultural and winemaking practices than does the temperature range of the region or vintage.

### *Irrigation and temperature*

Irrigation is a fundamental variable of viticultural practice. Intuitively, one might expect cool to equal less and hot to equal more irrigation, which is probably true when all other things are equal. But in nature, all other things are never equal.

Vineyards in the cool, dry Yakima Valley of Washington state and the even cooler coastal valleys of Chile, for example, are totally irrigation-dependent. By direct contrast, some of the best vine-

**Cool Climate Red Winemaking**

**1979**

Hand Pick
$SO_2$ at crusher
Destem/Partial whole berry crush
Chill to 10°C
"In House" yeast addition
"Headed down" fermentation
Juice (10–20°C), Cap (10–30°C)
Daily "rack and return"

**2005**

Hand Pick
$SO_2$ at crusher
Destem/Partial whole berry crush
Chill to 5°C
Cold macerate (1–2 days)
"In House" yeast addition
"Headed down" fermentation
Juice (10–20°C), Cap (10–30°C)
Twice daily "rack and return"

yards of the hot Clare Valley in Australia are managed as "dryland" vineyards.

Extend this comparison to Riesling, for which the Clare Valley and Yakima Valley are well known, and it is apparent that the objectives and practices in the vineyard and winery for Riesling are very similar in these contrasting locations. The variety and wine style dictate the practices, not the heat in the region.

### *Vineyard design and temperature*

Significant differences of vineyard design and management are employed across the diverse range of sites I have experienced, and they, too, are much more related to the choice of variety and implicit wine style and to other site characteristics than to the temperature range.

The chauvinism of "cool climate" as a concept is that it ignores the role of the other inputs that make up a "terroir," including the distribution of heat across the season and between day and night, humidity, light (quantity, quality, and rate of change), wind, soil, and geology.

Undeniably, climate is a prime factor in the choice of place to grow specific varieties. There is a chapter on maturity groupings of wine grape varieties in *Viticulture and Environment* by Dr. John Gladstones (published in 1992). With that book in hand, no one should make the inappropriate choice of location to grow Cabernet Sauvignon as was made in the too cool central Adelaide Hills in the 1990s.

However, theory does not explain all, as exemplified by time-proven success of Riesling in the Clare Valley, and it is not my intention to inhibit the experimentation with likely varieties in unlikely locations. I would only plead with the experimenters to do it in small quantities in the beginning.

**Cool Climate Viticulture in Australia, 1984/2005**

| 1984 | Tons | % |
|---|---|---|
| **Exports** | | |
| Volume (8.9 million litres) | | |
| Value ($16.4 million ) | | |
| 2.9% of domestic consumption | | |
| **Grape Production** | | |
| total wine grapes | 494,000 | |
| non-premium grapes | 231,000 | 46.7 |
| **Premium Wine Grapes** | | |
| total premium wine grapes | 263,000 | 53.3 |
| Riverland | 102,000 | 38.8 |
| Traditional | 119,000 | 45.2 |
| Cool Climate | 42,000 | 16.0 |
| **2005** | **Tons** | **%** |
| **Exports** | | |
| Volume (660.9 million litres) | | |
| Value ($2,747.6 million) | | |
| 154% of domestic consumption | | |
| **Grape Production** | | |
| total wine grapes | 1,855,095 | |
| non-premium grapes | 102,000 | 5.5 |
| **Premium Wine Grapes** | | |
| total premium wine grapes | 1,753,095 | 94.5 |
| Riverland | 1,074.102 | 61.3 |
| Traditional | 310,479 | 17.7 |
| Cool Climate | 368,357 | 21.0 |

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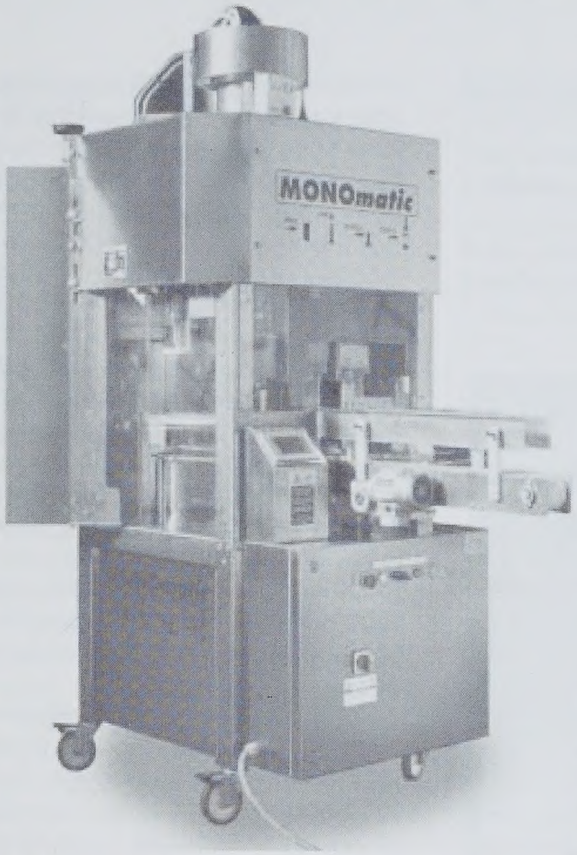


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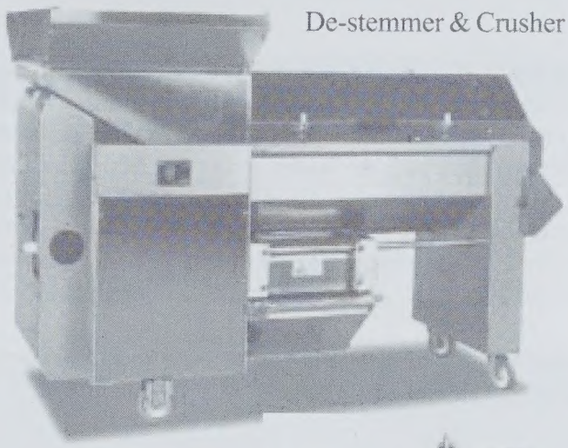

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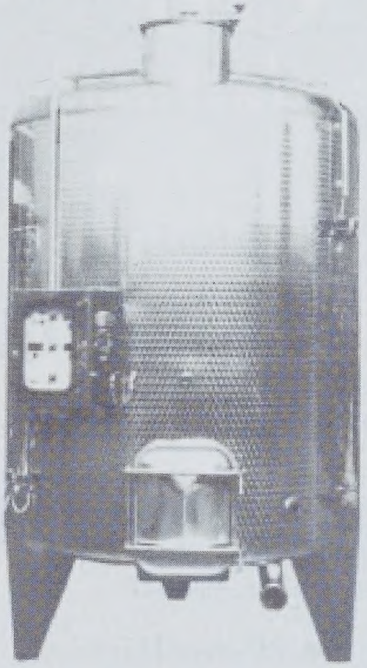
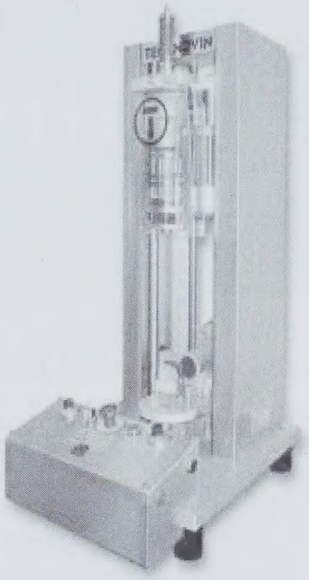
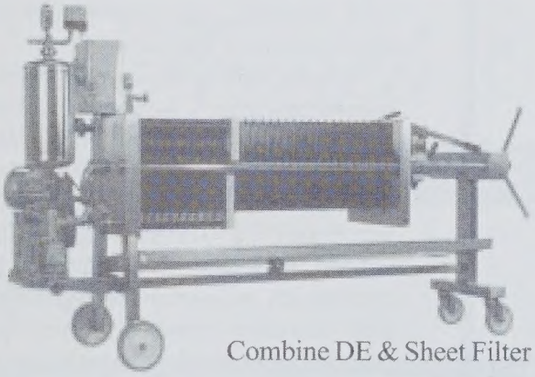


Punch-down Tank



Screwcapping Machine



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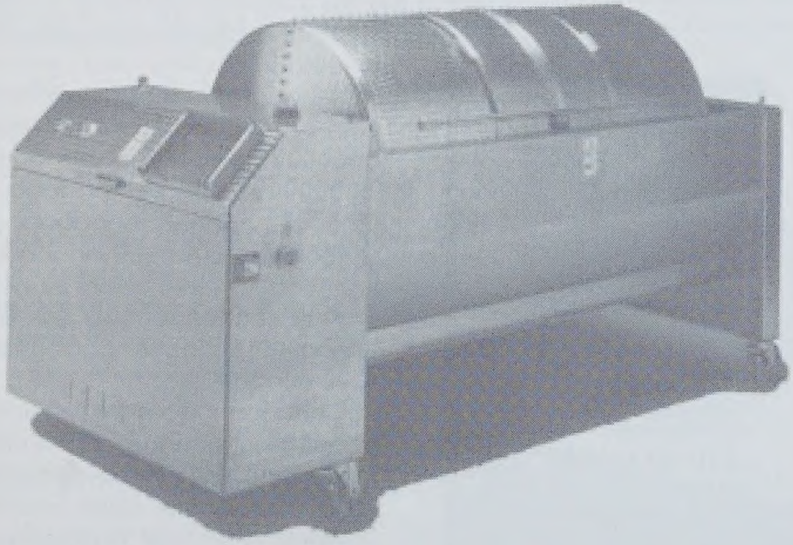

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Cool climate viticultural regions are currently distinctly unfashionable in Australia because:

- Our biggest grape surpluses exist there, particularly of Cabernet Sauvignon,
- These regions are where inappropriate choice of varieties, sites, and management techniques has the worst quality implications,
- Most of the old vine resources, particularly of Shiraz, are in warm and hot climate regions,
- Mr. Robert Parker says that Australian cool climate wines are "pale imitations of the real thing."

The reality is that Australian cool climate wines are largely as good as their New World counterparts, and they will improve as plantings and methods change, especially as vines mature. Parker is entitled to his opinion, and he is correct in saying that (some of) Australia's fine wine is made in hot regions.

### *Commodity wine and fine wine*

The real differences in viticultural and winemaking approaches are necessarily between practices employed for the production of commodity wine and fine wines. Viticultural and winemaking principles and methods are largely the same in all the fine wine regions in which I work, regardless of temperatures — cool, hot, and in between. They are much more dictated by the variety and wine style than the temperature of the region.

Commodity wine, by previous definitions, is: "consistent, available, and affordable wine made to a standard; it is marketed and sold under a brand and by variety rather than by a regional appellation; and it is largely sold through the supermarket and retail chains of the world."

Commodity wine is largely, but not completely, made from hot inland, irrigation-dependent, viticultural regions and is usually cross-regionally blended. It is largely sold at retail price points of less than US $10 and UK £5 and is consumed on an everyday-basis by consumers who exercise a binary decision making process about quality based on good value or not.

Commodity wine has to be consistent and pure within the requirements of the powerful retailers and government statutory standards. Altering the composition of commodity wine is both effective at achieving the standards required and is expected. The processes of ion exchange, micro-oxygenation, reverse osmosis, grape tannin and anthocyanin addition, and any other techniques to improve consistency and drinkability are legitimate in the pursuit of commodity wine standardization.

Conversely, at the core of the concept of fine wine is the idea of "naturalness." Fine wine consumers assess the hedonic quality of a fine wine much more intensely than their commodity wine-drinking counterparts, but they also

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give much more intellectual focus to origins of a wine and influence of a producer and methods. With few exceptions, fine wine is measured as a reflection of its origins — of the terroir from whence it came.

Central to the fine wine consumer's assessment of a wine's origins is the concept of naturalness, that the vigneron has not altered the essential wine style emerging from the terroir and has only employed natural and traditional practices to enhance quality and expression of the terroir. The concepts of terroir and naturalness in fine wine are antidotes to the prevalence of global manufacturing and standardization and are also at the core of the marketing concepts of organic and biodynamic.

**Wines made from hot and cold vineyards by Brian Croser**

| Region | No. Vintages | Heat Summation (°C Days) | MJT (°C) | Varieties |
|---|---|---|---|---|
| Piccadilly Valley Adelaide Hills South Australia | 22 | 1172 | 18.2 | Chardonnay Pinot Noir |
| Willamette Valley Oregon U.S. | 21 | 1191 | 19.2 | Chardonnay Pinot Noir |
| Parawa Southern Fleurieu South Australia | 1 | 1197 | 17.9 | Pinot Noir |
| Coonawarra South Australia | 26 | 1376 | 18.9 | Cabernet Sauvignon Merlot |
| Mount Barker Adelaide Hills South Australia | 10 | 1419.2 | 19.4 | Shiraz Viognier |
| Wrattonbully South Australia | 4 | 1472 | 19.1 | Cabernet Sauvignon Shiraz |
| Clare South Australia | 26 | 1737 | 21.45 | Riesling |

### *Commodity wine from cool climates*

There are two approaches to growing grapes and making wine in Australia's cool climate regions:

- The highly mechanized, standardized, and blended commodity-wine approach, and
- The fastidious viticulture, small-batch, regional/terroir fine-wine approach.

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They co-exist in most of Australia's cool climate wine regions, as do hybrids of these two approaches.

Dr. Tony Jordan, Dr. Terry Lee, and I prepared a paper for the very first International Symposium on Cool Climate Viticulture & Enology at Oregon State University in June 1984. That paper looked at the new and re-emerging cool climate viticultural industry of Australia — the regions, varieties, and grapegrowing and winemaking methods — and made some predictions for the future.

The 1984 paper foresaw the dual approach to cool climate grapegrowing and winemaking: "The essential difference between the large company and small vigneron approach is in quality aspirations. The large companies are using their (cool climate) vineyards to service a medium-price market and to produce a limited quantity of premium wine. The small vignerons are striving to only produce premium wines that can demand higher prices."

Methods used for commodity grape production in cool climates were described: "Many of the viticultural practices applied in the broad acre vineyards of the cool regions have their practical origins in the hot, irrigation-dependent regions of the Australian Riverland."

These practices included very wide tractor-row spacing to accommodate large equipment (a density of 1,500 vines/hectare), mechanical and minimal pruning, total herbicide control of the vineyard surface, large yields, high rates of irrigation, and mechanical harvesting and transport to large centralized wineries. The term "convenience viticulture" was coined to describe this model.

In the winery, the large batch processing for this cool climate fruit was no different than the handling of the fruit from hot irrigation areas. Juice and must amelioration — using ion exchange, acid addition, tannin addition, enzyme addition, mechanized extraction, oak chip infusion, centrifugation, and filtration — all preceded incorporation into large regionally anonymous blends. The cool climate components of these large commodity wine blends added a quality factor that was important to Australia's early success in the commodity wine market.

Currently, the same commodity approach applies to fruit derived from cool climate, traditional coastal valley and hot irrigation regions. Australia is experiencing the fallout of surplus production affecting all three regions because of their inter-changeability in commodity wine production. As the high proportion of young vineyards in Australia's cool climate regions mature, some will become a valuable source of quality wine for the commodity wine sector and others will be managed differently for the production of fine wine.

### *Fine wine from cool climates*

The 1984 paper described an alternative and new approach to cool cli-

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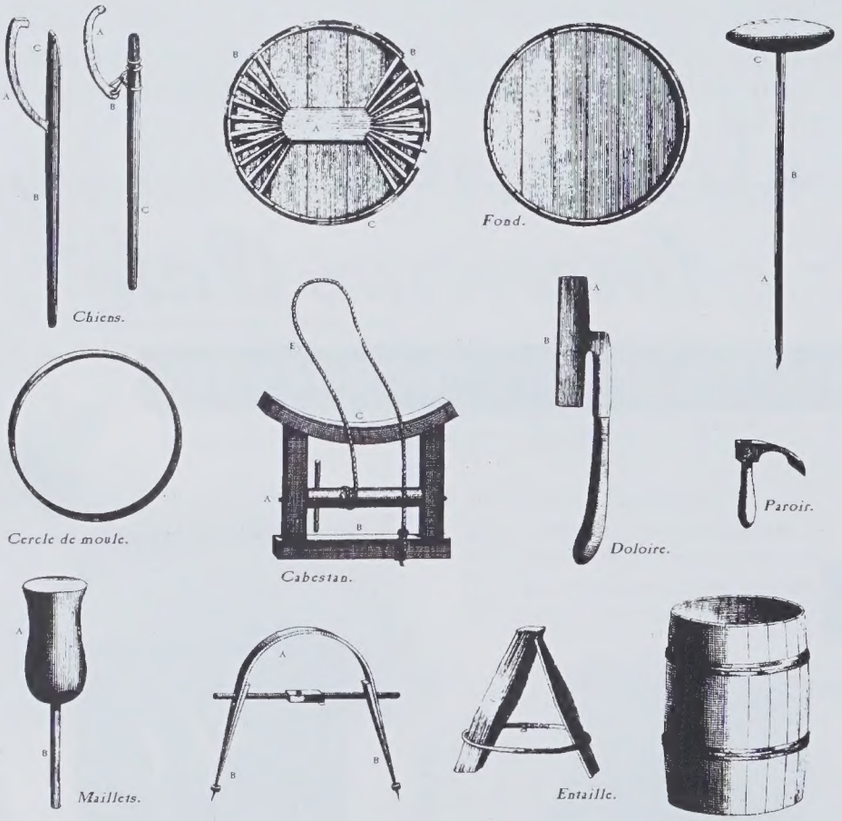


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mate viticulture and winemaking for Australia, largely based on Petaluma Winery's development of Chardonnay and Pinot Noir vineyards in the Piccadilly Valley and Cabernet Sauvignon and Merlot vineyards in Coonawarra. The paper termed this "close spacing viticulture."

The objective of the new viticultural approach was to control vine vigor by pruning to a large number of buds/hectare, deploying the shoots on a greater length of trellis and in a vertical canopy to optimize light interception, canopy ventilation, and fruit exposure.

These vineyards were planted on 2.1 meters between vine rows and 1.5 meters between vines — a vine density of 3,175 vines/hectare. The cost of establishment of "close spaced viticulture" was nearly twice the cost of the same area for "broad-acre vineyards." Operations in these close-spaced vineyards were only possible with specialized equipment and manual pruning, shoot positioning, and harvest with modest yields. The cost per ton was triple the cost per ton of "convenience viticulture."

The jury was out on whether close-spaced vineyards would be economically viable. In the 1984 paper:

"The anticipated quality differential between fruit from 'close-spaced' and 'broad-acre' vineyards should command an increased fruit and 'wine in the bottle' price. The capital-intensive, manually managed viticultural approach can only apply to vineyards serving the premium Australian wine market as opposed to the low-cost, broad-acre approach serving the middle-price market. It will be at least five years before it can be determined that significant quality differences exist between the two cool climate vineyard approaches in Australia."

The 1984 paper commented on the prevailing approach to cool climate winemaking with:

"The Australian winemaking approach has been developed over the last 20 years and is appropriate to vinification of grapes grown in all cimates. The basic assumption of this approach is that fruit character — achieved in the vineyard by a combination of selection of climate, variety, viticultural technique, and optimal harvest time — is the most important aspect of the flavor of the finished wine.

"Therefore, the winemaker should:

- Adopt those procedures in the winery that best retain that fruit flavor and,
- Manage changes to the fruit character in pursuit of complexity or style in a controlled fashion."

Assessing the scorecard after 20 years, close-spaced vineyards in Piccadilly Valley and Coonawarra have well and truly established their economic viability. The vineyard-first, fruit-retentive winemaking philosophy described in 1984 has been strengthened by 20 years of experience and refined to the interdependent goals of:

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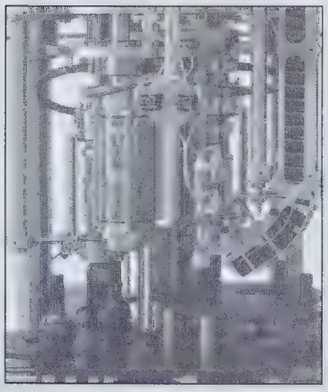

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• Optimization of the expression of the vineyard terroir and,
• The pursuit of naturalness in wine, avoiding wine amelioration by achieving optimal composition in the vineyard.

The appreciation of fine wine by knowledgeable consumers, with few exceptions, involves not only an assessment of the hedonic quality but also an expectation that the wine will reflect its origins or terroir in both its quality and style.

The most natural, least modified wine will best exhibit the unique properties of a specific terroir. These are the philosophies that guide the viticultural management and winemaking techniques employed in dealing with the set of vineyards and regions in which I am involved.

Those of us involved, as producers in the hugely fragmented fine wine industry, know that the fine wine consumers of the world do not lack for choice. We have to work assiduously to convince the "gatekeepers" and the consumers that there is something special about our wine and the vineyard from which it is derived.

It is not enough just to have great quality; that is a given for most of our competitors from most wine-producing countries. The point of differentiation required is the reality of a vineyard environment uniquely suited to specific varieties, the exclusivity of that location, and the vigneron's passionate belief in and intimate understanding of that site, of its terroir.

Patient empiricism based on decades of careful cultivation gradually elicits the best from the site but the consumer has to be convinced the vigneron's patient efforts are worth supporting along the path. The final paragraph of the 1984 paper is prescient about the future of fine wine producers in cool climate areas of Australia:

"Larger companies will increasingly require cool climate fruit produced at minimum cost to satisfy the requirements for the middle market. The small to medium-size producers, in order to survive in the small, highly competitive Australian premium wine market, are going to have to differentiate their wines on the grounds of Quality. To do this, they must experiment and invest in viticulture to produce the highest quality fruit possible from their vineyards, realize the quality of this fruit in their wines, and effectively market their different wine to the consumer."

### *Fine wine regions*

Fine wine regions of the world also range across hot to cool climates. Even the fine wine regions of France range from Chateauneuf du Pape (Orange) with a heat summation of 1794°C [326°F] days and an MJT of 22.9°C [73°F] to Reims in Champagne at 1031°C [1888°F] days and an MJT of 18.8°C [66°F].

All of the regions in which I have been involved are authentic fine wine regions, as measured by the repro-

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ducibility, uniqueness, and quality of the wines made from the varieties suited to those locations.

One defining characteristic of a fine wine region is that it ripens its appropriate varieties in the mid- and late autumn, not in the heat of mid-summer. For example, Riesling in the Clare Valley ripens in the last two weeks of March, whereas Chardonnay ripens in the last weeks of summer, in February.

Clare Valley is definitely not a fine wine region for Chardonnay. The phenological timetable of a variety in a region is an important guide to the quality potential of the regional/varietal combination.

### *The vine is the best integrator of the terroir*

The phenology of each variety in each site is a direct interpretation by the vine of all of the environmental inputs.

As lamented by Dr. Peter May in his excellent *Flowering and Fruitset in Grapevines*, there is a paucity of regional phenological information in Australia, and he pleads for growers "to compile and publicize phenological data and relate them to weather conditions."

Phenological events for the appropriate variety in a distinguished site are vital clues to the performance of the site and the management regime required to elicit its best qualities. The grapevine is not only responsive to the climate (weather) and light but also to soil temperature, moisture, and nutrient status, and the vectors of all of the above. The rate of change in many of these factors at the beginning and end of the season profoundly influence the hormonal balances of the vine and similarly affect the ripening process and eventual quality.

Some of the pertinent characteristics of each of the fine wine regions and distinguished sites in which I am involved are:

- Suitability to the chosen variety,
- Similarities to and differences from the European home of the variety,
- Choice of site and ameliorations,
- Planting regime,
- Management regime,
- Phenological and compositional consequences,
- Winemaking technique and modifications of these over time.

Let's look at two examples.

At Petaluma Winery, in the cool Piccadilly Valley region where I live, we pioneered Chardonnay. Our experience demonstrates the evolution of thought and practice required in a cool region to remain competitive in the world of fine wine.

By direct contrast, we'll examine, in detail, Riesling in the hot Clare Valley, indisputably an enduring fine wine terroir.

### *Chardonnay in the "cool" Piccadilly Valley*

Piccadilly Valley in the central Adelaide Hills is a unique viticultural environment, ideally suited to Pinot Noir and Chardonnay — the warmer, north-facing slopes for table

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wines and the higher elevations and south-facing slopes for sparkling wine. Perched behind Mt. Lofty between 400 and 710 meters (height of Mt. Lofty), most of the vineyards are situated on moderately steep slopes (10% to 20%) on the western side of the valley at altitudes between 450 and 550 meters.

The soils are of moderate depth, podsolized, and composed of sandy and clay loams over a brown to orange, friable clay layer and parent rock. The most typical soil is formed on shales of the Burra group (700 to 800Ma), although two vineyards are on much older gneissic basement rocks of the Barossa Complex (1600Ma). All soils are free-draining, and most have quite high amounts of shale gravel (30% to 40%) throughout the profile and moderately high (4%) organic matter in the surface soil.

Rainfall in the Piccadilly Valley ranges between 1,000 mm and 1,200 mm, and the vineyards are situated in the higher rainfall locations of the valley. On average, 420 mm of the rainfall occurs in the growing season between October and April. Temperature summation for the growing season is 1172°C [2142°F] days and the diurnal temperature range is 11.8°C [21.2°F] (minimum) and 15°C [27°F] (maximum). Average humidity at 1500 hours is 52%.

This is a cool, moderately continental, humid grapegrowing environment of moderate fertility with a potential for high vigor. The climate statistics are almost an exact replica of Burgundy (Dijon), except–Piccadilly has significantly more sunshine hours (1,771 compared to 1,449).

### *Original plantings in Piccadilly Valley*

The original plantings are the clones that were available in the early 1980s (OF, Mendoza, 110 V1), on own roots. The fruiting wire is 800 mm above ground and the vine rows are 2.1 meters apart and vines are spaced 1.5 meters apart in the row giving 3175 vines/hectare. Two sets of moveable foliage wires subtend about one meter of vertical canopy. Originally, the vines were trained to a permanent cordon but quality considerations have driven a conversion to cane-pruning over the past five years.

The vineyards are largely farmed dryland, with mown perennial rye grass sward and periodic liming (two tons/hectare) to maintain soil pH above 6. Average vine age is 20 years, and they have developed a self-sustaining balance at 70,000 buds/hectare, cane-pruned to 22 buds/vine.

Shoot spacing is 15 per meter, and the canopy is moderately open but requires shoot thinning and leaf removal on table wine sites. The canopy area per vine is 3.5 square meters, and there is a supersufficiency of leaf area of 1.6 square meters per kilogram of fruit.

The fruit reaches high sugar ripeness nearly every year. The crop level has sta-

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bilized at an average of 7 tons/ hectare, which approximates a single 100-gram bunch/shoot or 2.2 kilograms per vine. Disease pressure is low in these vineyards, even in years when Botrytis is epidemic in the Adelaide Hills.

The average Chardonnay picking date, calculated over two vineyards and eight vintages, is April 12 with a juice analysis of 23.4°Brix, cold stable acid of 8.75 g/L, and 3.3 pH.

### *New plantings at Piccadilly Valley*

We can do better! We are replacing old plantings with Dijon clones (76, 95, 96) on devigorating rootstocks (Riparia Gloire and 101-14). New vines are trained at 0.5m above ground to get the benefit of ground warmth at night to promote respiration and secondary compound synthesis. The aim is more flavor and earlier maturity at lower sugar. Vine spacing is 1.5m x 1.5m (4,444 vines/hectare) and vine height is 1.3m with a canopy height of 0.8m.

Retaining 70,000 buds per hectare, there are 16 buds per vine arranged as bilateral canes each of six buds and two replacement spurs. This reduces the shoot spacing to 10 per meter, and the canopy is very open requiring no shoot thinning or leaf removal.

At one bunch of 100 grams per shoot, the yield will be 1.6 kilograms per vine. Each vine has 2.5 square meters of canopy and 1.6 square meters of canopy per kilogram of fruit (still in the luxury range).

As a trial, I intend to reduce canopy height to 0.7 meters and increase bud numbers to 80,000 per hectare giving 1.2 square meters per kilogram of fruit. These are some of the potential small changes to be made incrementally in a controlled fashion with the ultimate objective of achieving better flavor ripeness at lower sugars and hence lower alcohol.

### *Piccadilly Valley Chardonnay winemaking*

The first Piccadilly Valley Chardonnay grapes were harvested in 1984 from the Tiers Vineyard. The first wines were made with ultra-conservative techniques:

- must chilled to 2°C [36°F],
- $SO_2$ and ascorbic acid at crushing,
- stems assisted quick drainage from tank press,
- pectic enzyme,
- filtered juice,
- own yeast, cold fermentation in new oak (10 to 15°C [50 to 59°F]),
- no malolactic fermentation,
- finished wine sulfured and returned to barrels,
- storage of barrels at 5°C [41°F] for six months,
- anaerobic bottling with $SO_2$ and ascorbic acid.

Over the next two decades as the juice composition, quality, and behavior became apparent and predictable,

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the winemaking approach has simplified and changed in the following ways:

- $SO_2$ added to the juice tray only after pressing,
- no stems in the press,
- no pectic enzyme,
- racking very slightly turbid juice to fermentation,
- fermentation with own yeast strains,
- bentonite added at beginning of fermentation,
- fermentation in barrels, 60% new, temperature (15 to 20°C [59 to 68°F]),
- malolactic fermentation in barrels on full yeast lees,
- $SO_2$ added after malolactic fermentation completed,
- allowed to settle on full lees for six months,
- bottled without ascorbic acid.

As a final comment about Piccadilly Valley Chardonnay, the same set of seven "distinguished site" vineyards have been made separately each vintage and as the vineyard plantings and practices are the same and in each vintage the same winemaking techniques are employed for all vineyards, a comparison of individual vineyard qualities is well controlled.

Consistently over the period, the vineyards have produced distinctive wines which fall into categories of texture, aromas, and flavors according to the geology from which the soil is formed;

- Basket Range Sandstone (750Ma) — light texture, accentuated grapefruit,
- Wool-shed Flat Shale (700Ma) — medium texture, tropical fruit, and nectarine,
- Calc-silicate (1600Ma) — most textured, ripe peach, and fig.

In the Piccadilly Valley, terroir differences exert reproducible effects on wine style and character across vintages.

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### *Riesling in the "hot" Clare Valley*

The success of Riesling in the Clare Valley has been recognized for more than a century. I grew up in Clare Valley and well-remember the community pride in the wine quality and superior flavor of peaches, apricots, and nectarines.

Clare Valley is a perched valley at much the same elevation and in same range of hills as the Piccadilly Valley. The Hanlin Hill Vineyard is contoured onto the steep west-facing escarpment of the valley at 500 meters elevation. With a MJT of 21.45°C [71°F] and a heat summation of 1,737°C [3159°F] days, Clare is, by definition, a hot viticultural region and an unlikely Riesling terroir.

However, I never think of Clare as being hot, and the Riesling grapes from Hanlin Hill Vineyard and the juice and wines have a fresh, crisp acidity and lime character that is cool-climate in nature. The phenological timetable of Riesling in Clare Valley parallels that of Chardonnay in Piccadilly Valley about two weeks ahead. Clare Valley has a much greater diurnal temperature range than the 11.8°C [53°F] of Piccadilly Valley, averaging 15°C [59°F] over the growing season.

In Clare Valley, the days are hot and the nights cool, but not so cool as to impede respiration and formation of secondary compounds, thus wearing away the sugar accumulated during the limited part of the hot days when the vine is photosynthesizing. The slate-littered western slope also helps maintain ideal night temperatures in the fruit on the very low (500mm) traditional trellis.

The result is six to seven tons/ hectare of Riesling at full flavor maturity, at a plateau of modest sugar level, beyond which additional time on the vine only leads to acid degradation and pH rise.

Afternoon sea breezes from the west, the slate-derived soil, wide contoured spacing (only 1,200 vines/ hectare and 35,000 buds/hectare), 150mm of irrigation in January and February; all of these factors contribute to the proven success of the bone dry, moderate alcohol, fresh lime and acid, refined, traditional Australian wine style that is Clare Riesling.

New VSP plantings on closer spacing and trellised to a 900mm fruiting

wire are producing bigger yields with a fraction of the fruit intensity although acids are higher.

You may have noted that the cool Piccadilly Valley does not need irrigation and the shallow soil, steep slope, and hot Hanlin Hill does, apparently contradicting my opening claim that the regional heat does not change practices in the production of fine wine. The spacing and irrigation practices at Hanlin Hill resemble very closely those of Riesling vineyards in the cool, but arid Yakima Valley (Washington state).

### *Clare Riesling winemaking*

Unlike Piccadilly Valley Chardonnay, Clare Riesling requires no steep winemaking learning curve, thanks to the efforts of previous generations of winemakers, and the 2005 Hanlin Hill Riesling was made in much the same way as the first vintage in 1979.

Fastidious care is required with hand-harvested ripe grapes, which are sulfured, crushed, and chilled to an air-bag press. The stems are returned for quick draining, light pressing, and small acid adjustment if necessary. Juice receives an enzyme-assisted cold settling to near brilliance and a long, slow fermentation with a selected "in house" yeast at between 10°C [50°F] and 15°C [59°F]. Bentonite is added half-way through the fermentation.

At dryness, the wine is chilled to –2°C [28°F], settled to brightness, and racked and filtered to bottle as soon as possible.

This is a simple winemaking process, and the quality of the finished product is a direct reflection of Hanlin Hill Vineyard's distinguished Riesling terroir.

### *The final say*

I hope this detailed examination of the cool and the hot of my fine wine world has led to an appreciation that there are many factors important to the success of a terroir beyond temperature — although in most cases the choice of variety is largely driven by the temperature of the region.

There are many apparent contradictions and paradoxes involved in growing grapes and making fine wine:

- Riesling in the Clare Valley,
- The viticultural paradox of choosing a cool area and a hot site,
- Highly productive valley floor locations producing the finest wine (because of great vine age),
- Pinot Noir,
- Almost anything said to be a truth by a winemaker.

There are also many misrepresentations made in the cause of gaining competitive edge, for example:

1. Higher latitude is inherently better for quality because of greater day length (on April 1, day-length at 45°S is 11.52 hours versus 11.66 hours at 35°S),
2. Only soils formed from limestone will produce great Chardonnay and Pinot Noir,
3. Almost anything said about yield and quality by a grapegrower.

These are a few of those wonderful things.

Finally, I say to the scientists, just because cause and effect cannot be established, the many empirically observed correlations and differences between sites and their wines are not invalidated.

Terroir is the complex fingerprint of nature in a location, expressed through a vine variety and molded and shaped by man's management of the site and the winemaking process.

Thirty-five years of being involved in the fine wine industry have taught me to be skeptical of the skeptics and to hold in awe the consistency of expression of distinguished sites and the consistency with which some of my colleagues recognize characteristics of and differences between the great vineyards and their wines. ■

***Editor's Note:*** *conversion of one hectare = 2.47 acres*

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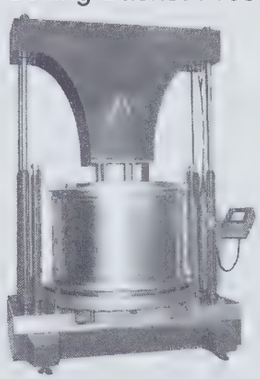

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COVER STORY

PENNER-ASH WINE CELLARS

# Form follows function, marrying a winery with the landscape

Photo by Janis Miglavs

BY Stephen Lapp,
Waterleaf Architecture,
Portland, OR

When co-owners Chris and Tyanne Dussin and Lynn and Ron Penner-Ash acquired an 80-acre site for Dussin Vineyards and Penner-Ash Wine Cellars in Yamhill County, OR, in 2002, they had an opportunity to plan a vineyard and design a winery simultaneously. Careful placement of the winery buildings and access roads gave the best soil and sun exposure to the grapes, while saving the best views and necessary hillside elevations for a gravity-flow winery.

A preliminary design reflected the approximate size and footprint of the winery facility, incorporating process-flow concepts desired by winemaker Lynn Penner-Ash. Primary and service roads were carefully tailored to the existing topography to minimize grading and excavation costs. Once the preliminary design was complete, vineyard block layout was completed, and planting began on 15 acres of vineyard in 2003.

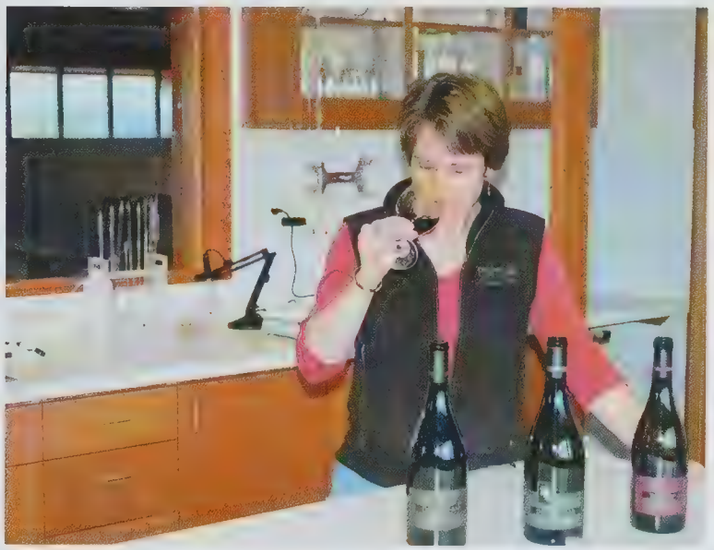
Penner-Ash Wine Cellars production is about 80% Pinot Noir, 10% Syrah, 5% Pinot Noir-Syrah blend, and 5% Viognier. Grapes are sourced from Dussin Vineyards and other Oregon vineyards, with a harvest window of about six weeks (mid-September to end of October). The winery was designed to optimize the making of Pinot Noir in small lots, and the harvest window and multiple grape sources allows some turnover of fermentation tank or bin, thus reducing the size of the fermentation hall.

The new winery is a three-level, gravity-flow facility with 18,000 interior square feet and capacity of up to 10,000 cases. Gravity-flow includes: fruit to fermentor, new wine to settling tank and press, wine to barrel. Wine is moved in reverse by a Bulldog Pup gas-pressure racking wand.

The winery development project team consisted of the partners — the Penner-Ashes, who operate the winery,

**Exterior crush pad with sorting line located on upper level to the right. Overhead door is located at the fermentation (middle) level. Portable fermentation tanks and bins are positioned beneath the cantilevered deck to receive destemmed fruit. Once full, they are moved into fermentation room.**

At the tasting bar, visitors can taste wine and ask questions regarding the winemaking process. The answers to some of their questions are illustrated visually in the work areas that are visible through glazed openings behind the bar.



Lynn Penner-Ash tastes a wine blend in the 320 square foot lab. There are two workstations and 50 linear feet of perimeter work counters. Counter tops are made of an acid-resistant plastic laminate. Artificial lighting over the 4 x 8 table utilizes full spectrum fluorescent lamps that compliments natural lighting that facilitates evaluation of wine clarity and color when tasting.

and the Dussins, Waterleaf Architecture (Portland, OR), and general contractor O'Brien Constructors (Portland, OR).

When the winery development process began, winemaker Lynn Penner-Ash identified many goals to be met by the facility design. It should:

- Have two or three levels of gravity-flow. The hillside slope made this possible, but the number of levels depended on winery siting.
- Offer visibility and easy communication from one space and one level to the next. The winery's small staff would function best if they could easily see and talk to one another.
- Incorporate ergonomic design to minimize muscle strain and potential injuries to workers.
- Be a sustainable or "green" design.
- Enable visitors to "experience wine production" without interfering.
- Provide a stunning tasting room and dining room for marketing events that takes advantage of the views of surrounding hills and valleys.

### *Design process*

In February 2002, the architects and Lynn and Ron Penner-Ash walked the site to become familiar with its characteristics. Much of the property has steep slopes, some planted with second growth Douglas fir trees.

They decided that the vineyards would be located at the top of the property, where there are both Willakenzie and Jory soil classifications, unique for such a small site. A grove of mature Oregon oaks was identified as a feature that everyone wanted to protect, and a gently serpentine-shaped main approach road was planned to slow down visitors and allow them to enjoy the views of the vineyard and beyond to the Wapato and Chehalem valleys and the distant Cascade Range's Mount Hood and Mount Jefferson.

It is important to consider the building and service yard requirements when planning a vineyard and designing a winery. In some winery projects, the location of the winery and its space needs (both inside and outside) are not given adequate consideration, and some of the functions inside or outside of the building become compromised due to a lack of space.

Construction began in July 2004 and was completed before the 2005 harvest. Pat O'Brien (O'Brien Constructors, Portland, OR) offered expertise in winery construction methods and cost-estimating. Bob Grummel (Grummel

Exterior covered crush pad on left. Lab and staff room windows to the right of crush pad. Harvest bin full of fruit extended by pneumatic arms up to approximately 120° position. Fruit slides from bin to hopper, then to sorting conveyor. Translucent roof at crush pad/fermentation/press deck porch allows natural lighting.

**At one end of the fermentation hall, a wall provides space for a fittings board and hose rack with 20 heavy-duty rope-pulleys where hoses up to 50 feet long are hung for drying and storage. (Photo by Janis Miglavs)**

**The south facing clerestory features a very wide light shelf located above the tasting room and lab. The shelf is angled, so winter sunlight can pass deep into the building, with some light reflecting off the shelf onto the ceiling, which increases daylight in the fermentation room and reduces glare. During the spring and fall, the amount of reflected light off this shelf increases with the sun's higher altitude, and the amount of direct light decreases. During the summer, an overhang reduces the amount of mid-day sun penetrating into the building, thus reducing heat gain, but still allowing reflected daylight. (Photo by Janis Miglavs)**

Engineering, Portland, OR) provided structural design services. Dave Humber (MGH Associates, Vancouver, WA) was consulting civil engineer, and landscape design and drawings were prepared by landscape architect Carol Mayer-Reed (Mayer-Reed, Portland, OR).

Each of the winery's three levels has on-grade access. The upper level includes the public entrance, dining room, tasting room, offices, staff room, lab, and crush pad. The middle level has fermentation, storage, and the mechanical/electrical room. Barrel storage, drain/press and blending tanks, the press, and additional storage are on the bottom level. Accommodation has been made for a mobile bottling truck. Case goods storage is off-site.

The building is organized into zones: production spaces and visitor spaces are adjacent, but not interwoven, thus keeping visitors out of production areas unless they are on guided tours. The zones also allow expansion of either production or office/visitor areas without one interfering with the other.

The cross-section design allows the building to "flow" down the hill, stepping from one level to the next. Most of these steps are either visually connected or open to a common environment, as the fermentation hall (middle level) is open to the tank room (bottom level). **Author's note:** A cross section looks at a building as if it is sliced through one location of the building. In this case, this is the transverse building section [similar to slicing a loaf a bread across its length], as opposed to longitudinal cross section [slicing bread parallel to its length].

The cross-section design has several additional advantages. First, it minimizes the mass of the winery from the approach road. Second, because most of the interior volume is set within the earth, there is less temperature fluctuation which, in turn, moderates heating and cooling costs. Third, natural light enters into the production area from two offset north-facing bands of clerestory windows, set high in the space, and one south-facing clerestory window with a light shelf.

### *Winery operation*

Perhaps the easiest way to understand the winery layout and design is to follow the production flow. Fruit arrives at the crush pad on the top level, where a mobile scale is used to weigh bins of grapes. In Oregon, rain showers and storms are common during crush, therefore fruit protection is important. The roof overhangs the crush pad allowing bins to be stacked against winery walls, remaining dry while waiting for processing.

A forklift delivers 4-ft. x 4-ft. x 2-ft. harvest bins onto a bin dumper controlled by pneumatic arms and operated by the same individuals working the sorting line. Pneumatic arms rotate bins, slowly dumping grapes into a hopper above a vibrating doser hopper, which moves grapes onto a sorting conveyor. It carries grapes up a slight incline toward the destemmer. All this occurs outside on a large porch, underneath translucent roof panel skylights, which allows generous amounts of natural light. Natural light improves sorting performance and reduces eye strain for workers.

All fruit is hand-sorted as it moves along the conveyor where leaves, insects, loose stems, and partial or whole clusters unacceptable to the winemaker's standards are removed. From the sorting conveyor, grapes enter the destemmer, then descend to the fermentation deck on the middle level, where either portable fermentation tanks or bins receive destemmed grapes.

Grapes are fermented in small lots, and Penner-Ash blends the lots together later at appropriate stages. The winery's fermentation tank capacity allows for 1.25 turns. Given that the majority of the fruit arrives from other vineyards and includes both Syrah and Pinot Noir, harvest stretches out long enough to allow for 25% of the tanks to be turned with some cushion in an average year.

Two four-ton tanks on legs and four three-ton portable tanks are aligned on one side of the fermentation room adjacent to a catwalk. This catwalk provides access to the covered crush pad and lab above, and to power, glycol, and water hook-ups on the fermentation room wall below. Remaining fermentation tanks are mobile, either three-ton, two-ton tanks, or 1.5-ton macro bins.

Flexible hoses connect tanks to the building's glycol system with quick disconnect couplings. Couplings are organized on a manifold mounted at the building's concrete column base, which was widened in the design to receive utility piping and connections. The number of couplings installed serves half the tanks stationed at each manifold, minimizing process-piping installation costs.

**Barrels can be washed in this area in inclement weather. When it comes time for filling, barrels are aligned on steel barrel racks, filled, and moved via an electric or manual pallet jack, then stacked with a forklift in a barrel room. Use of steel barrel racks was one ergonomic strategy that the winemaker wanted to incorporate. (Photo by Jane Mylrea)**

"We cold soak for up to five days at an average temperature of 40° to 45°F," explains Penner-Ash. "We disconnect glycol from cold-soak tanks to allow the must to slowly warm up and connect glycol to fermenting tanks to control fermentation temperature."

Tanks are then disconnected as their contents cool and the cooling glycol is needed elsewhere. A single trench drain is located in front of the tanks, parallel with the catwalk.

Free-run wine is drained from fermentors to the winery's bottom level via flexible hoses connected to either fixed or portable tanks. The hoses are conveniently dropped over the open side of the fermentation hall to the tank room below. Sufficient elevation drop between the two levels enables free run wine to flow easily to lower tanks.

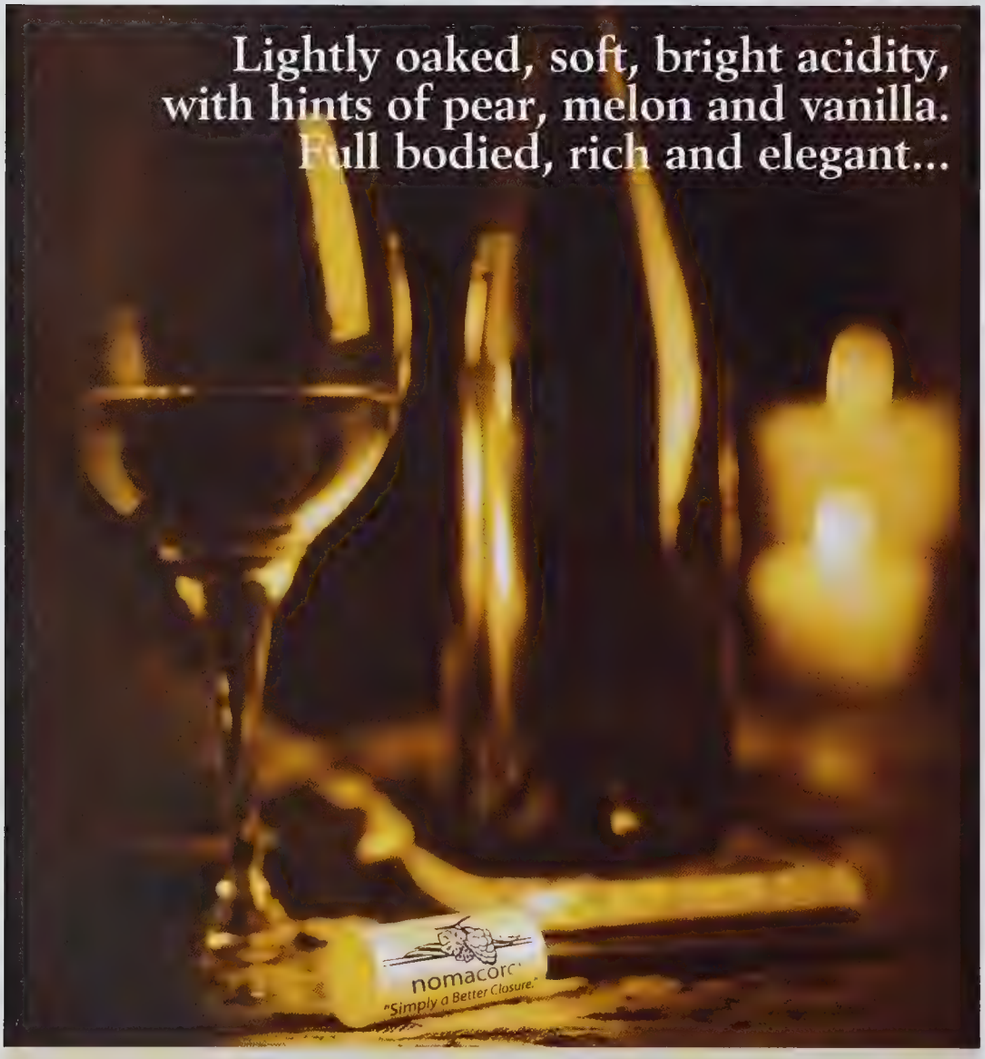
Fermented must is shoveled out of fernentors into bins or moved in the portable bins and tanks to the exterior covered fermentation deck and shoveled through tank doors into a 3000-L Europress on the bottom level.

Viognier grapes — the winery's only white variety — are delivered directly to the fermentation deck for processing. They move directly to the press and juice goes into a stationary tank on the bottom level.

The middle, fermentation level contains the building's mechanical/electrical room, positioned to minimize wiring runs to the major equipment (saving on installation costs). It also provides exterior access for servicing mechanical/electrical equipment without entering the winery. Storage rooms are located around the perimeter in an L-shaped configuration, below rooms on the above crush pad level.

The winery's lowest level was designed with four major areas, two inside (tank room and barrel rooms) and two outside (press deck and service yard). Outside, the press deck is under the continuation of the same cascading roof that shelters the fermentation deck and crush pad. An overhead door and man-door lead to the tank room, where drain and press tanks and blending tanks are located along an exterior wall with a catwalk. The space is designed for five 1,000-gallon drain-and-press tanks, plus several smaller ones, and two 2,000- and one 3,000-gallon blending tanks. The room width accommodates those tanks, and barrel staging.

Prior to bottling, barrels are moved back to the tank room, and the wine is pumped with a Bulldog Pup gas-pressure (using nitrogen or argon) racking wand to blending tanks.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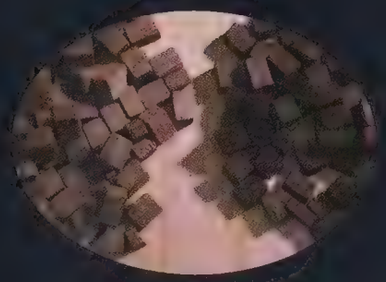

**Cubes**
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**Dominoes**
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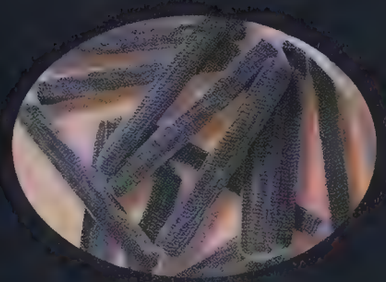

**Oak Chain** *(Chapelets™)*
piece: 10"x1"x3/8"
*(25cm · 2.5cm · 1cm)*

**Blocks**
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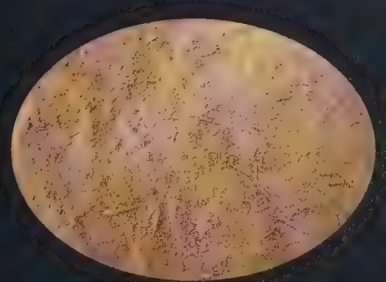

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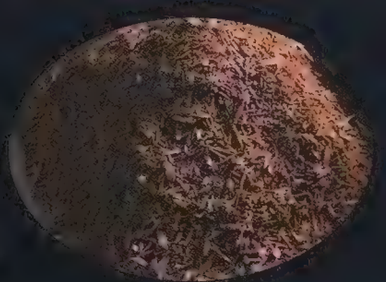
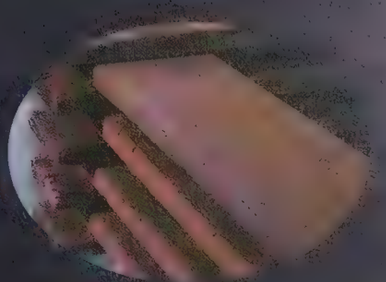


**Pencil Shavings**



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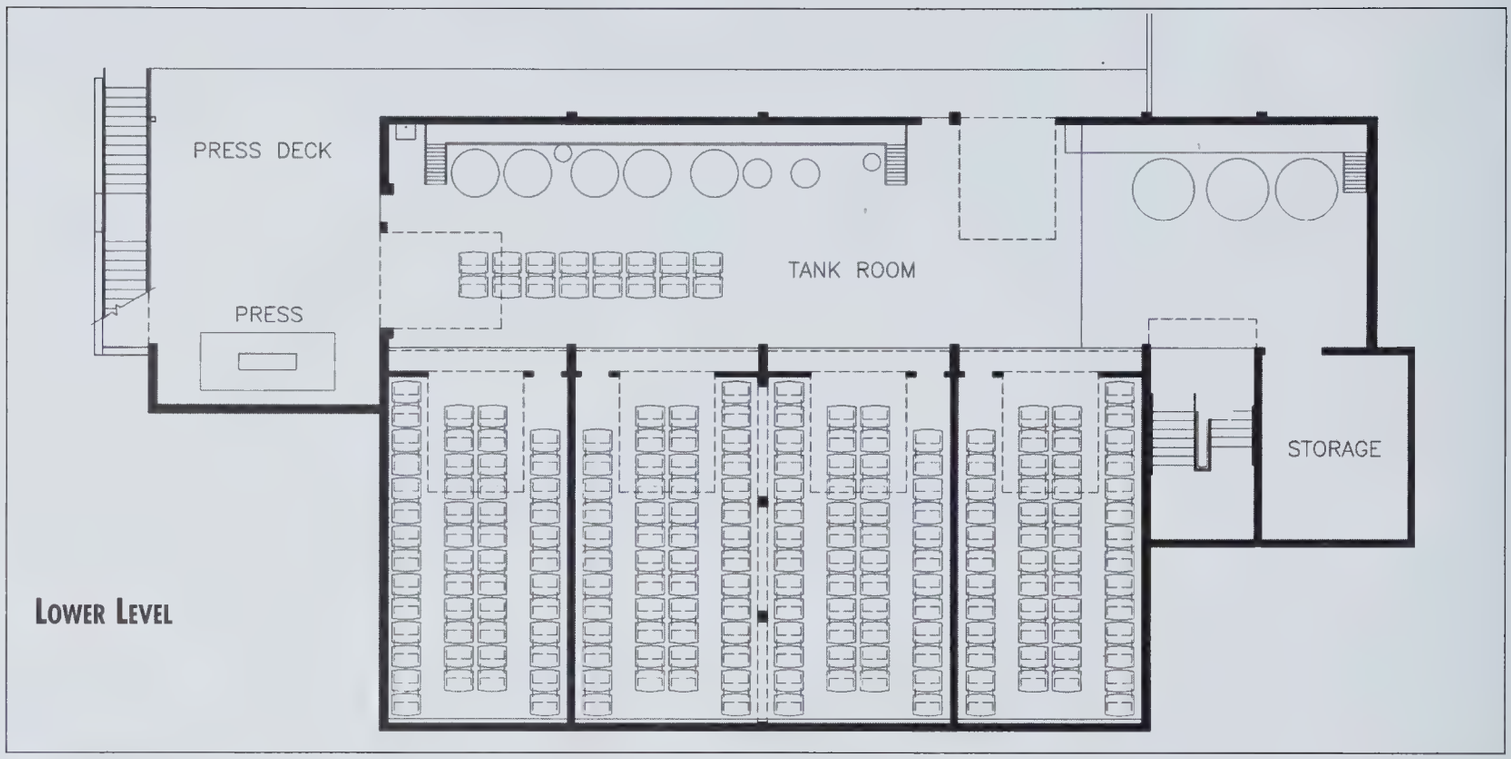
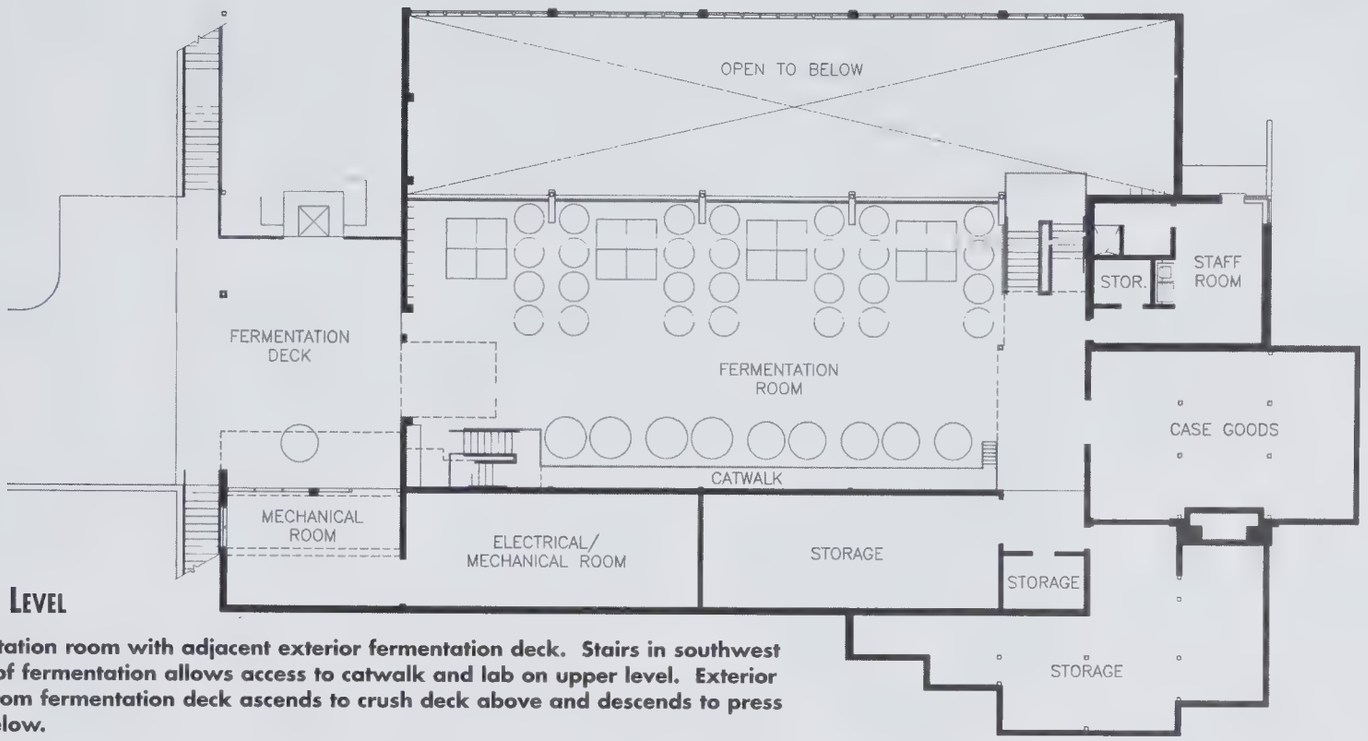



**Catwalk with drain/press and blending tanks along north wall. Barrel rooms are set against the earth and accessed via the tank room.**

The barrel rooms have three concrete walls set either against the earth or each other and open to the tank room thru overhead glazed doors. Barrel stacks are limited to three high, which determines the height of the ceiling with additional clearance above the top barrel for access with a Bulldog Pup. One room has the capacity for further subdivision if required in the future, thus creating four distinct barrel rooms. Multiple rooms allow for wines to be cellared over a vintage if desired and for individually controlled temperature for each room if needed.

Because the surrounding earth acts as a thermal mass and provides insulation, the barrel rooms require minimal mechanical heating and cooling. If periodic heating and cooling are required, fan coil units can be hooked up to connections to the building's glycol cooling system or inexpensive portable space-heaters can be placed inside an individual barrel room.

The fourth major area is the exterior service yard. Accessed via an overhead door or a man-door between the drain




**MIDDLE LEVEL**

**Fermentation room with adjacent exterior fermentation deck. Stairs in southwest corner of fermentation allows access to catwalk and lab on upper level. Exterior stairs from fermentation deck ascends to crush deck above and descends to press deck below.**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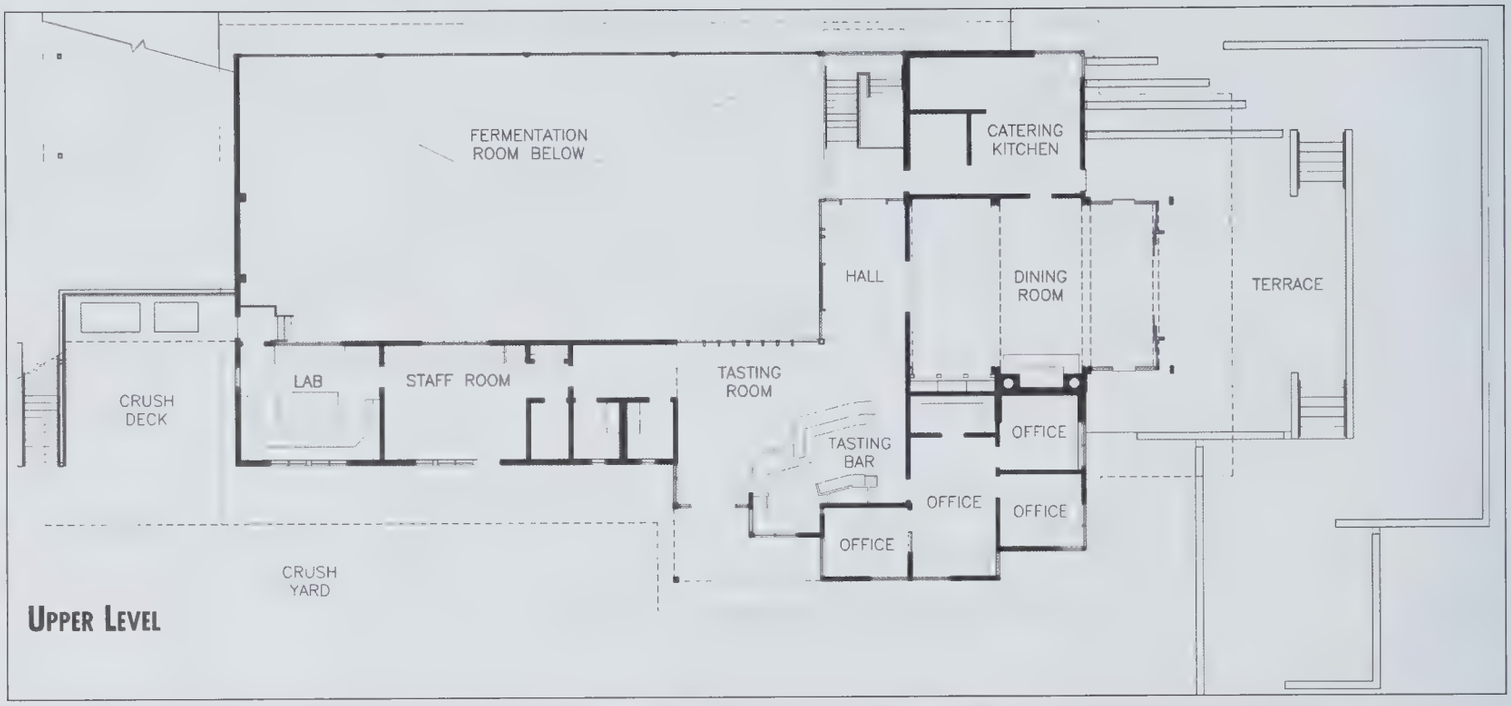


**The L-shaped configuration of lab, staff room, tasting, offices, dining room and catering kitchen wrap around the production area. Generous amounts of interior glazing allows views from tasting room and hall into fermentation level below. Dining room opens to terrace and views of the Chehalem Valley beyond.**

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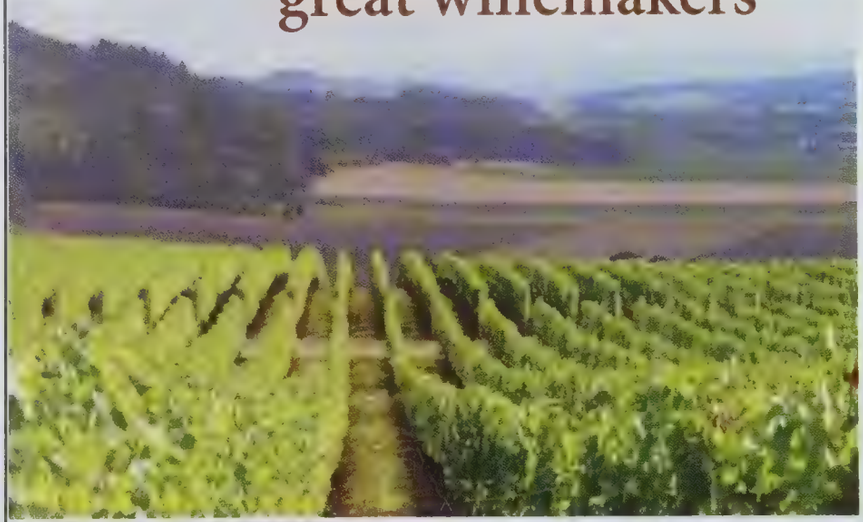

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and press and blending tanks, this court can accommodate a mobile bottling truck, and it offers the required utility hook-ups. Barrel washing can occur outside in this area during nice weather, due to close proximity to the barrel rooms.

All exterior and most interior production area walls are constructed of un-insulated concrete. Laminated wood beams clear-span the major spaces, supporting wood I-joists with R-30 batt insulation above an interior ceiling of wood plywood. A gap was created between the top of the insulation and the bottom of the roof deck to allow for natural ventilation from eave to ridge, venting any condensation that may develop in the roof/ceiling assembly, minimizing conditions that lead to dry rot.

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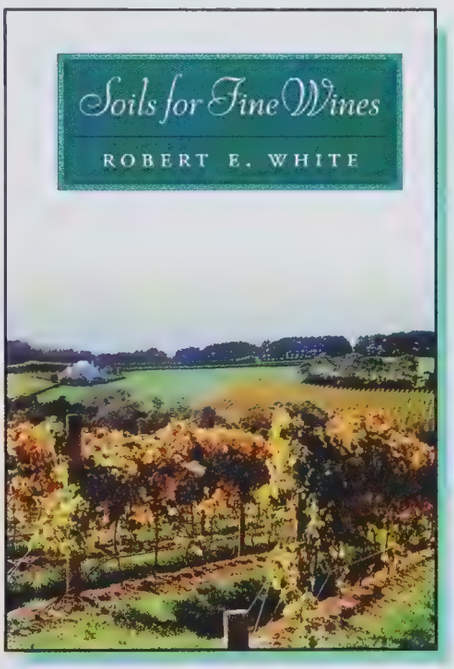


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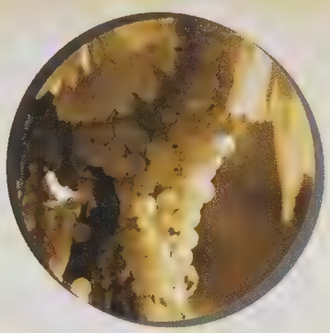

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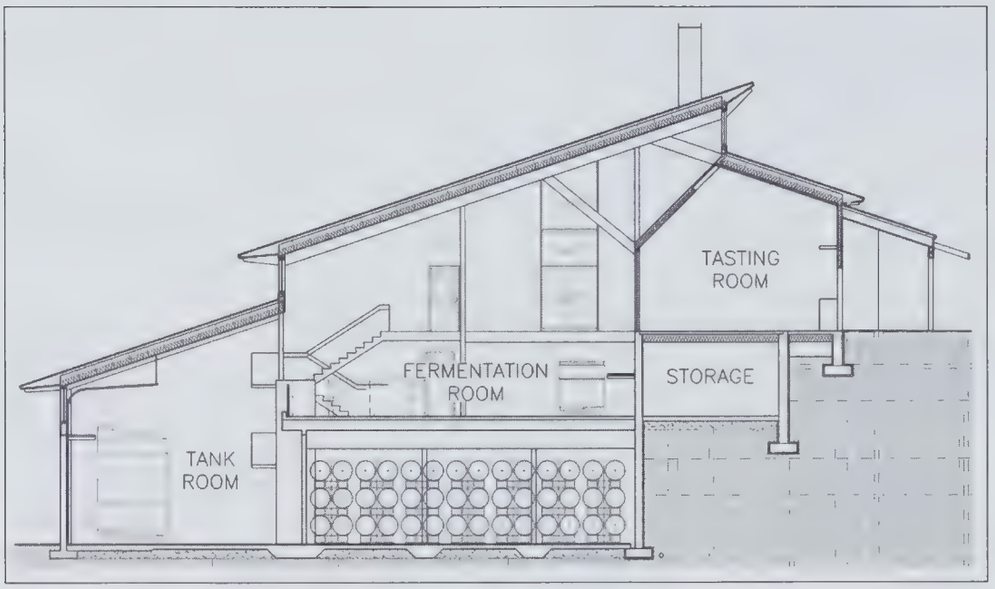


**Barrel room stacked below fermentation room. Tank room and fermentation share common airspace. Angled light shelf forms interior ceiling of tasting room, with south-facing clerestory windows located above ceiling.**

between 75° and 80°F in summer. Because the barrel rooms and many of the production rooms are set within the hillside, the surrounding earth acts as a thermal mass and provides insulation. Interior building temperature fluctuations are stabilized, and the winery requires minimal mechanical heating and cooling.

Barrel rooms are separated from fermentation by a composite floor system of 4-inch concrete topping slab over a 12-inch concrete core deck, and separated from the tank room by an overhead door and a man-door. Thus the barrel rooms are buffered from exterior temperatures by either the earth or another room.

The fermentation and tank rooms have overhead mounted room heaters to take the interior chill off when desired, but no mechanical cooling; natural ventilation is used instead. Although different heating and cooling systems were explored and the use of insulated tilt-concrete panels was considered, the most cost-effective solution was to

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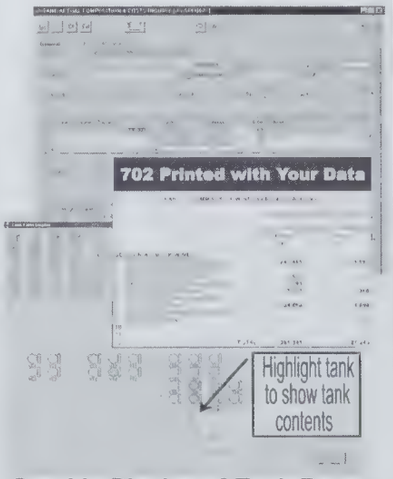


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insulate the ceiling to a high performance level and leave the walls un-insulated. This provides a durable surface for both the interior and exterior of the production rooms.

$CO_2$ exhaust fans are mounted at the tank room floor level beneath the catwalk stairs on the exterior walls. If activated by a monitoring system, louvered vents high at the ridge of the fermentation room on the south-facing clerestory open to correct the air pressure imbalance created by the exhaust fans. During summer, the air flow direction is reversed, and the high louvered vents exhaust the hot air rising up to the sloped ceiling, while cool air enters low, either through $CO_2$ fan-vents or through overhead doors, which can be left open in the morning.

### *Administration and hospitality*

Built in an L-shaped configuration, the offices, tasting room, dining room, staff rooms, lab, and storage wrap around the production areas. All these rooms have been carefully positioned to facilitate internal views into the production areas, while bringing in natural light. The lab and staff rooms are located at the end adjacent to the crush pad and offer

views of the approach road and crush yard and into the fermentation hall and tank room.

At the corner of this L-shape are the main visitation rooms and offices. These "clean" areas have exterior views of the vineyards, valleys, and surrounding hills, and interior views of the fermentation hall and tank room.

Beyond tasting room operations, several special marketing events are staged throughout the year. For these events, internal views of the production areas can be cut off from the tasting room by sliding a custom-built wall hung with two-dimensional art across these glazed openings.

Around the corner from the tasting room, a "dining" room can accommodate catered events and larger wine tastings matching food with wine. The room comfortably seats 40 and features a 12-foot wine cabinet built of Douglas fir. A custom-built fireplace with bronze hood anchors the south side of the room, with views of Chehalem Valley with Mount Hood seen through windows on the east wall.

Swinging doors and stacking glazed doors open to expand the room out onto exterior stone terraces. A generous overhead porch continues at the same level as the dining room ceiling. Similar in depth to the crush, fermentation, and press deck porches on the opposite end of the building this porch is finished with higher quality materials.

The palette of materials and colors used at Penner-Ash was carefully chosen to reflect the Pacific Northwest and its landscape: flagstone from the Cascade mountain range, western red cedar siding, and Douglas fir windows, doors, and interior trim.

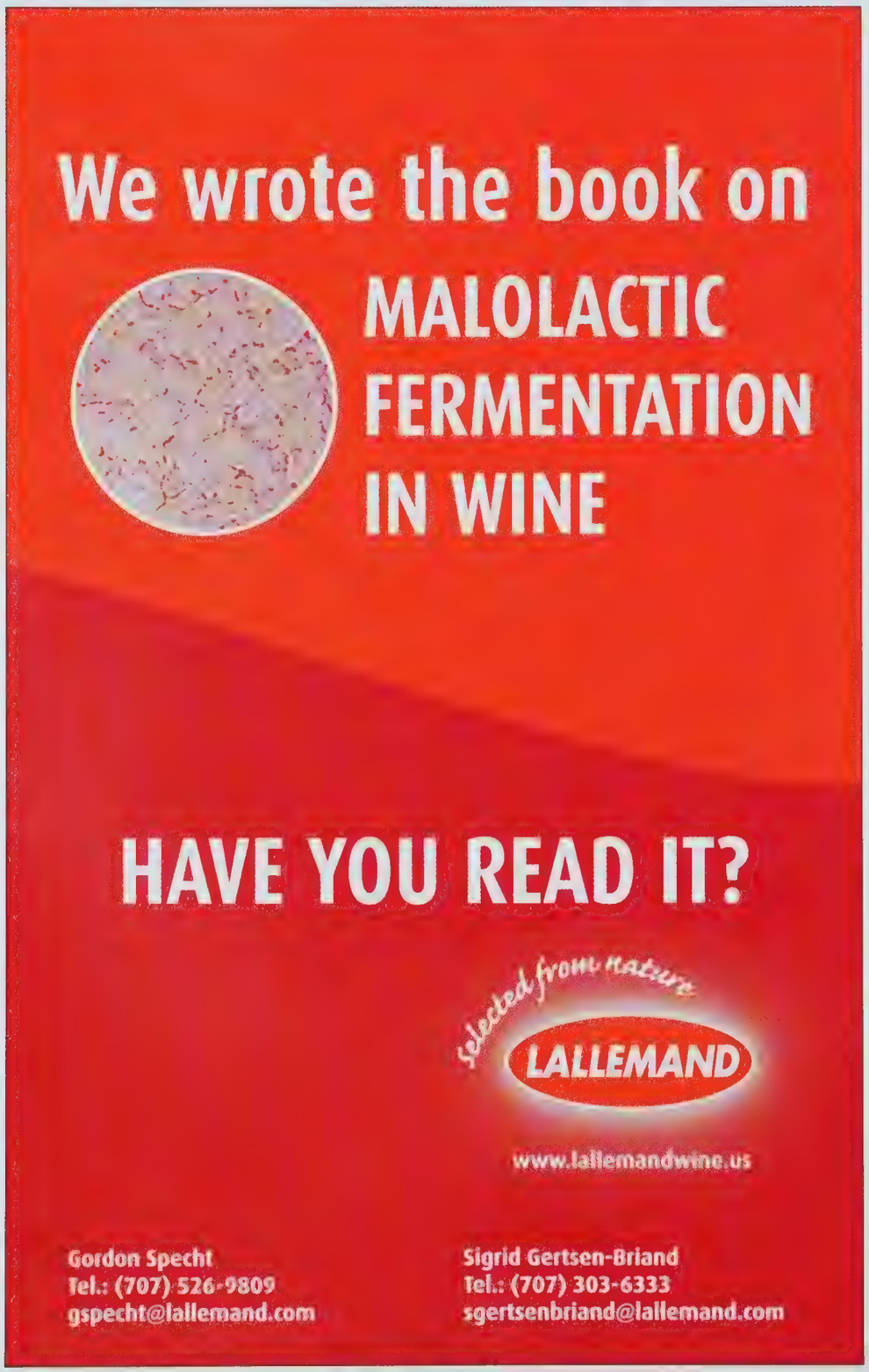
### *Sustainability*

One goal of the Penner-Ash Wine Cellars design was to reduce the use of electricity to heat, cool, and light the facility by utilizing natural systems, including passive heating and cooling, natural ventilation, and daylight. To enhance performance of these natural systems, three areas were carefully considered and planned for:

1. Building location and orientation on the site.
2. Building organization (where indoor and outdoor rooms are located with respect to the compass, the exterior, and other rooms.)
3. Placement, size, and materials for individual building components.

The winery is sited on a ridge to take advantage of the natural ventilation provided by prevailing winds to cool the building in summer.

Nearly a square, it is the optimum shape for conditioning and maintain-



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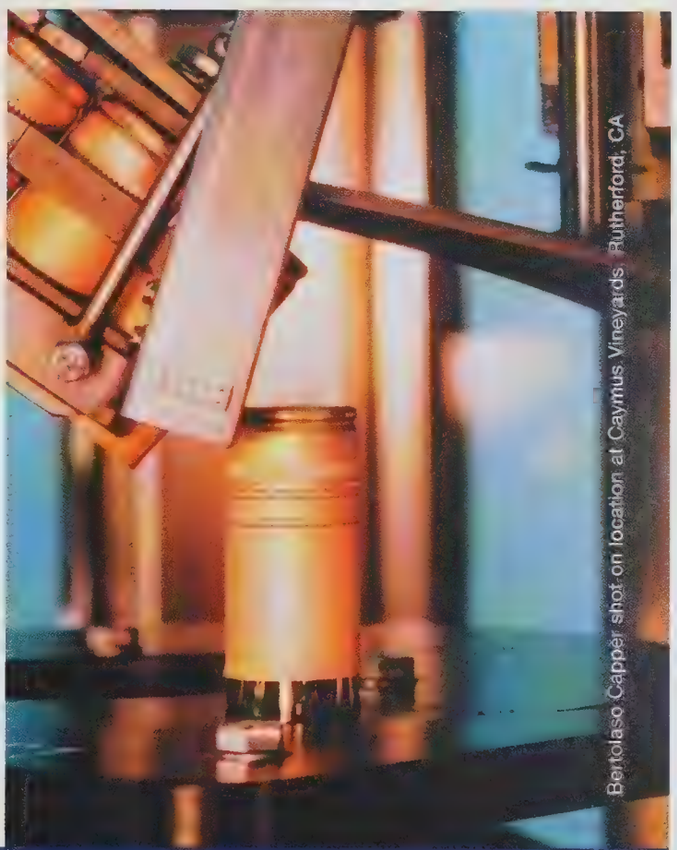

Bertolaso Capper shot on location at Caymus Vineyards, Rutherford, CA

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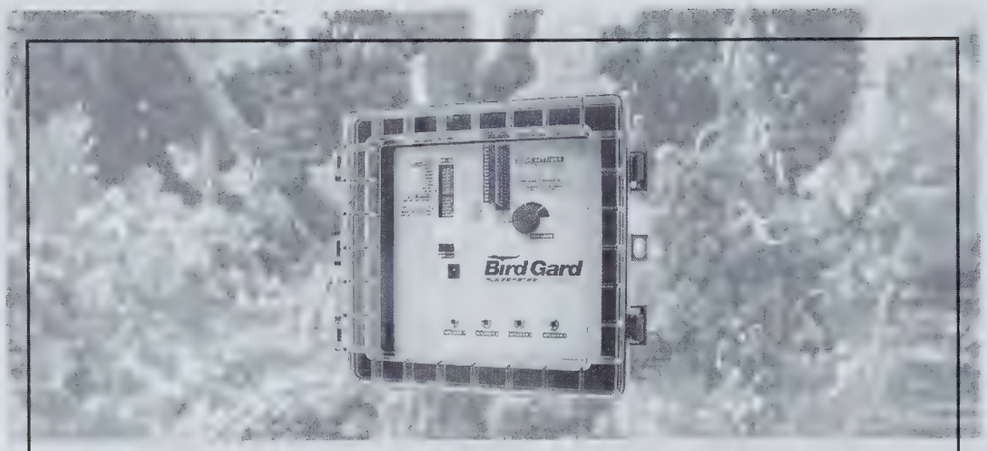


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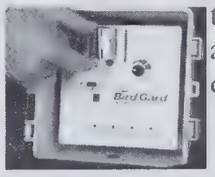
The Super PRO II for **$550** (and the new PRO Plus for **$325** that covers 3 acres) has distress calls that randomly change in frequency, duration, and individual speaker sequencing. That means the calls coming from one speaker at a time create the illusion injured birds are scattered throughout the vineyard. And each species call is electronically modulated creating the illusion more than one bird of that species is injured. (NOTE: Both the Super PRO II and the PRO Plus now have the chip in front so they can be easily replaced for new chip updates.)



**What vineyard managers are saying about the Mega PRO**

"All the birds just left...nothing left. We even stopped using the canons. The Mega PRO really did a great job." - Bob Kidston, Dykeview Farms

"The Mega PRO paid for itself the first season because of the money we saved on bird patrols and pyrotechnics" - Daryl Salm, Valley Farm Management

"Two years ago we got the Mega Pro. After the horrible 2004 season, with many vineyards getting little or no grapes, a 3 acre section of riesling yielded 20 tons. Needless to say, our wine maker was very happy. Had the starling flocks been there, we would have lost $20,000-$30,000 worth of grapes." - Jack Keller, Hazlitt 1852 Vineyards

The Mega PRO has 120 decibels of output and covers up to 30 acres. It's 60 times as powerful as the Bird Gard Super PRO II that covers up to 6 acres. Included with the Mega PRO is a 200 watt amplifier, a 20 speaker tower, and a 40 watt solar panel. List: $3000.
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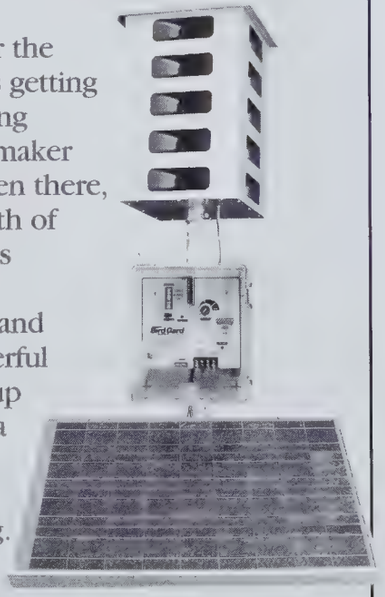

MEGA PRO

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ing interior temperatures. Within the square, individual rooms and areas are narrow and oriented north/south for better daylight penetration and natural ventilation. The rooms most frequented by people (hospitality, office, staff, and lab) are located in a thin band along the south side to absorb solar radiation and utilize natural daylight.

Barrel rooms, case goods storage, general storage, and mechanical rooms — that is, rooms with lower lighting requirements and less tolerance for temperature swings — are located below grade. The most-used public outdoor room, the dining room terrace, is positioned on the east end, where summer afternoon and evening activities are shaded by the building. The winery's stair-step levels and large rooms that are open to each other provide both cross- and stack-ventilation and pass daylight from one level to the next.

The cross-section profile features three bands of clerestory windows, one facing south, two facing north. The south-facing clerestory has three advantages. First, it allows direct sun to penetrate deep into the building's center, providing heat gain during the winter from solar radiation when the concrete walls and floors of production spaces absorb direct sunlight and interior air is warmed by solar radiation.

Second, this south-facing clerestory is located at the highest part of the space, facing the leeward side of the building, with several operable louvers for natural ventilation. Third, southern light is reflected off building surfaces, balanced by north light from two other clerestories.

Overhangs protect the building walls and windows from direct sun, reducing solar heat gain during summer. Individual and grouped windows enhance day-lighting, views of surrounding vineyards, hills, and valleys, and winter sun entering into the winery for solar radiation. Electric lights are grouped and switched on separate circuits to give individual control of light levels where daylight is sufficient.

As discussed earlier, the building has buffer zones designed to provide thermal protection to rooms that most benefit from it. The two lowest levels are set within the earth, with two or three sides surrounded by soil. Portions of these levels that are adjacent to the earth are reserved for wine storage, where they are sheltered from extreme winter cold and summer heat.

Surface finishes were selected to minimize off-gasing of volatile organic compounds (VOCs). Certain finishes, such as the exterior wood finishes, were manufactured one hour away in Portland, OR. In addition to their durability and aesthetic qualities, many materials used at the winery were chosen for their availability in the region, thus minimizing energy used for transport.

### *Summary*

The marriage of practical and visceral has created a distinctive and welcoming place in the hills of Yamhill County. Those that work Penner-Ash Wine Cellars at Dussin Vineyards benefit from a design that complements the wine-making process. Visitors appreciate the winery's profile knit into the beautiful landscape. According to co-owner Chris Dussin, "We wanted to be as respectful to the land as we could and we wanted to make the building appear as if it belonged there. I'm thrilled with the way it turned out."

Note: the project won *Northwest Construction* magazine's "Best Small Private Project" award for 2005. The magazine says, "Separate panels of industry experts from Washington and Oregon judged our entries for the Northwest Construction Best of 2005. The criteria was [sic] based on technical skill, contribution to the community, the ability to overcome challenges, safety and innovation." ■

*Stephen Lapp, a partner and licensed architect at Waterleaf Architecture (621 SW Morrison, Suite 125, Portland, OR 97205. Tel: 503/228-7571), has both a professional and personal interest in designing wineries.*

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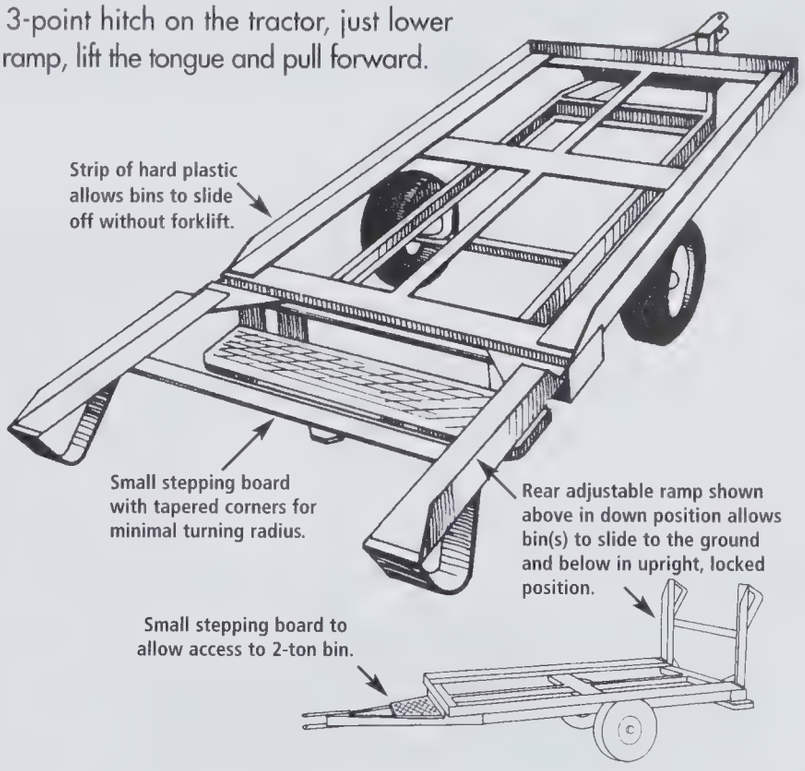
Strip of hard plastic allows bins to slide off without forklift.
Small stepping board with tapered corners for minimal turning radius.
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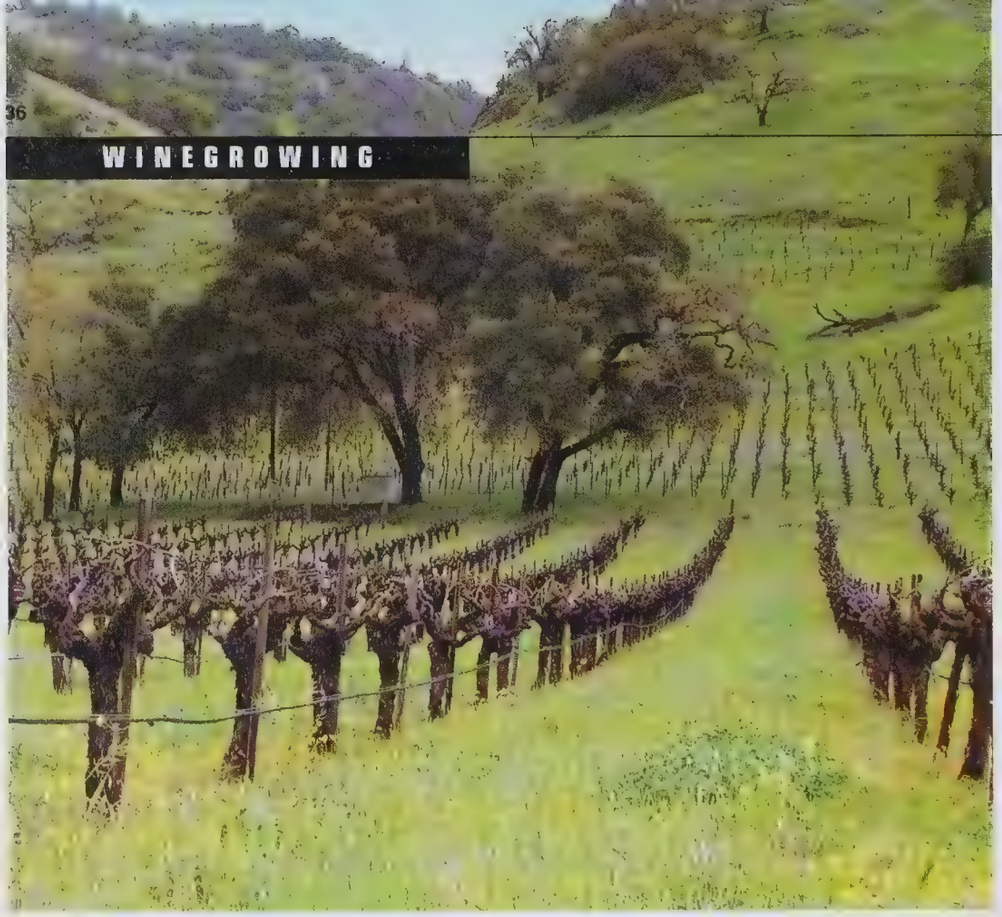


30-year-old Cabernet Sauvignon vines in Block-H with clover and cayuse oats cover crop. Photo by Dave Vella.

CHATEAU MONTELENA

# Balanced Soils

## play a vital role in high-quality wines

BY Jack Heeger

Chateau Montelena (Calistoga, Napa Valley) has gained a reputation over the past three decades as a producer of high quality wines, particularly Cabernet Sauvignon. Dave Vella, vineyard manager, tends nearly 200 acres of vineyards and credits the high quality to vineyard location.

"The estate vineyards are located in a special place, where the soils and climate and slope have come together to create the perfect spot to grow Cabernet Sauvignon," Vella explains. "Our location makes growing great fruit easy."

Other factors also contribute to Chateau Montelena's success, especially some very careful sustainable vineyard practices that have played a major role in taking advantage of everything the winery's seven vineyard locations offer.

About two-thirds of Chateau Montelena's approximately 32,000 annual case production is Cabernet Sauvignon; most of the remainder is Chardonnay, with a small amount of Zinfandel and Mendocino County Riesling.

### *Vineyards*

The Estate Vineyard is the Montelena's largest (about 115 acres). Eighty-three acres are planted to Cabernet Sauvignon, nearly 20 to Zinfandel and Primitivo, and the remainder to Merlot and Cabernet Franc, which are blended into the winery's Napa Valley Cabernet Sauvignon.

Other vineyards surrounding the estate include Vella's personal 12.5 acres planted to Cabernet Sauvignon; Barberis, with 28 acres of Cabernet Sauvignon and Merlot; Montelena Blossom Creek (15 acres) and Montelena Garnet Creek (six acres), both planted to Cabernet Sauvignon, and Wolleson, an eight-acre vineyard just south of Calistoga planted to Cabernet Sauvignon.

In addition, Chateau Montelena leases a 55-acre vineyard in the Oak Knoll District at the base of Mt. Veeder near Dry Creek Road, where mostly Chardonnay grapes are grown.

Vella supervises all the owned and leased vineyards, including Oak Knoll, but the hands-on manager at Oak Knoll is Bill Hanna, who planted the vineyard for owner Frank Takahashi.

Hanna owns and manages a neighboring vineyard from which Chateau Montelena sources Chardonnay. Hanna's vineyard produced about half of the Chardonnay bottling that was rated tops in the famed 1976 Paris tasting.

Vella is assisted at the Napa Valley properties by four full-time employees, all of whom have been with Montelena for 17 years or longer.

Chateau Montelena produces about 1,500 cases of Riesling from purchased grapes grown in Potter Valley.

Yield at Montelena's vineyards is generally between one and two tons per acre for Cabernet Sauvignon (planted in the 1970s), Cabernet Franc, and Primitivo/Zinfandel. Merlot vines

Fall-sown clovers, phacalia, poppy and grasses grew into a visually attractive spring cover crop, with added benefits of preventing soil erosion, limiting weeds, elevating soil organic matter, improving soil tilth and providing habitat and food resources for beneficial life forms in the vineyard ecosystem.

are more closely spaced and can yield three to four tons per acre.

### *Vineyard soil*

The estate vineyard has Bale, Cole, and Kid series soils that were formed from alluvial and sedimentary parent materials in the lower elevation vineyards and Cortina and Pleasanton series soils that were formed in volcanic parent materials, such as rhyolite in hillside vineyards.

Montelena's vineyards elsewhere in the Calistoga district are all located adjacent to tributaries of the Napa River and most have alluvial soil, with cobbly, gravelly subsoil, allowing deep root penetration and good drainage with medium (highly variable) water-holding capacity, resulting in moderate vigor.

Six acres of estate Cabernet Sauvignon are planted on Bale and Cole series that are sedimentary soils with a high percentage of clay, producing more vigor, and hillside blocks at upper elevations are planted on rocky, well-drained volcanic soil.

Chardonnay vineyards in Oak Knoll are planted in Haire-loam soil, which contains considerable sedimentary material, such as decomposed shale and blue/gray clay, with moderate drainage.

From his start in 1985, Vella had been maintaining the vineyard soils with annual applications of chicken manure and compost. Feeling that he needed a better balance, Vella set about to enhance the vineyard soils.

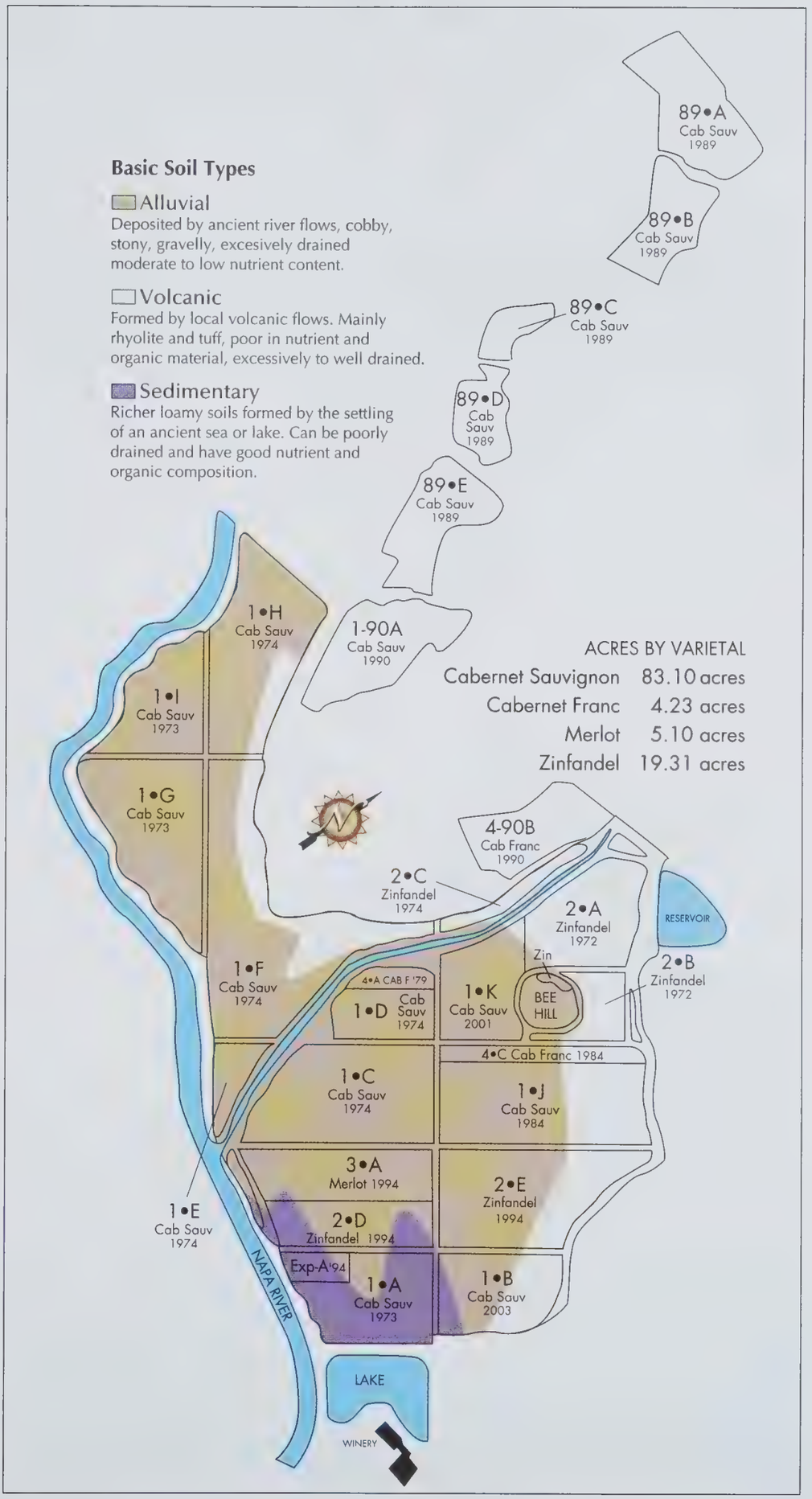
"In college, in soils class, you learn that if you're looking at this type of soil then you add this nutrient," Vella says. "But that's not how it really works."

One day Vella attended a meeting at which Bob Shaffer, an agronomist with Soil Culture Consulting, spoke. As Shaffer addressed the group, Vella thought, "He's talking about exactly what I'm experiencing." Chateau Montelena hired Shaffer as a consultant in 1994, and he has been working with the winery ever since making soil health improvements.

"We've done it in small increments," Vella explains, in deference to his concern for making mistakes by changing things too fast.

For example, with low fertility soil, he asks himself, "What did weed growth patterns look like before the vineyard was planted and vine growth began?"

"Weeds are plants growing on soils with mineral balance and cultural


Basic Soil Types
Alluvial
Deposited by ancient river flows, cobby, stony, gravelly, excesively drained moderate to low nutrient content.
Volcanic
Formed by local volcanic flows. Mainly rhyolite and tuff, poor in nutrient and organic material, excessively to well drained.
Sedimentary
Richer loamy soils formed by the settling of an ancient sea or lake. Can be poorly drained and have good nutrient and organic composition.
ACRES BY VARIETAL
Cabernet Sauvignon 83.10 acres
Cabernet Franc 4.23 acres
Merlot 5.10 acres
Zinfandel 19.31 acres
89•A Cab Sauv 1989
89•B Cab Sauv 1989
89•C Cab Sauv 1989
89•D Cab Sauv 1989
89•E Cab Sauv 1989
1-90A Cab Sauv 1990
1•H Cab Sauv 1974
1•I Cab Sauv 1973
1•G Cab Sauv 1973
4-90B Cab Franc 1990
2•C Zinfandel 1974
2•A Zinfandel 1972
RESERVOIR
Zin
2•B Zinfandel 1972
1•F Cab Sauv 1974
4•A CAB F '79
1•D Cab Sauv 1974
1•K Cab Sauv 2001
BEE HILL
4•C Cab Franc 1984
1•C Cab Sauv 1974
1•J Cab Sauv 1984
3•A Merlot 1994
2•E Zinfandel 1994
1•E Cab Sauv 1974
2•D Zinfandel 1994
Exp-A'94
1•A Cab Sauv 1973
1•B Cab Sauv 2003
NAPA RIVER
LAKE
WINERY

practices that limit more favorable species from growing," explains Shaffer. "Each plant has an ecological niche where they are most successful. Soils with excess nitrogen, poor structure, and low soil organic matter content are conductive to coarse weeds like star thistle, little mallow, and marestail, for example.

"The balance of soil minerals, especially nitrate nitrogen, calcium, and magnesium, and cultural practices largely determines the species and density of resident vegetation in a vineyard. Systematic selection and management of cover crops, in conjunction with developing good soil mineral balance and developing soil organic matter, is the most effective and economical form of weed management for a vineyard."

Vella did soil analyses and took tissue samples, but he says, "My biggest fear was changing something that was working, so we went into soil enhancement very cautiously."

But Shaffer, who took the first soil sample at Montelena in 1994 and began work "in earnest" in 1999, says winery staff has been "very supportive in making changes. I respect Chateau Montelena personnel for what they're willing to learn and for their desire to build a program for soil health over time, that acknowledges the existing cultural practices."

A soil analysis is done every year on samples taken from three to ten acres maximum in each vineyard. Shaffer's first soil analysis revealed that winery soils are part of the Pleasanton and Bale soil series, "and I was already familiar with those soils series," Shaffer recalls. "I knew the estate soils would greatly benefit from improved mineral balance and elevating the soil organic matter level even though these two series of soils are very different in texture.

"The balancing of minerals and introduction of more organic matter into the soil are synergistic with each other and create elevated levels of soil health that provide many substantial benefits to vines such as improved fruit quality and prevention of diseases."

Addition of minerals, nutrients, and organic matter to Chateau Montelena's vineyards began in 1999 with soil application of mined minerals, such as rock phosphate, potassium sulfate, calcium carbonate, and calcium sulfate, as high-quality sources of slow-release minerals.

Quantities are determined by soil analyses, which should be conducted annually because the quantities of minerals used will differ from year to year. For example, Shaffer notes that boron and sulfur must be applied more frequently because they are easily leached.

"Minerals are applied whenever it's convenient and fits into the work schedule before the rainy season," adds Shaffer. "It takes rain to make them work and become available in the soil."

### *Cover crops*

A cover crop was seeded in 2001 at Chateau Montelena, with crimson clover and barley in lower elevation vineyards and rose clover and zorro fescue on hillsides. "It was beautiful," notes Shaffer, "but it also added to the soil.

"Each year since 2001, we have rotated and diversified the cover crop species to includes both annuals and perennials including clovers, grains, California native grasses, European grasses, herbs, and flowers. We select and cultivate cover crops for soil health features such as erosion prevention, increasing soil organic matter, water holding capacity and infiltration, and elevating soil food web functions.

"Additionally, we have employed cover crops to act as a habitat and food resource for beneficial life in the vineyards such as predator or parasitic arthropods, insectivorous birds, and beneficial vertebrates like weasels and foxes. Culturing a diversity of plants with good strategic placement within the vineyards and which can provide pollen, nectar, and habitat over the grape cropping cycle is the goal of beneficial insectary plantings.

"Plants like alyssum, buckwheat, carrot, crimson clover, common vetch, and yarrow, in addition to many resident grasses, wildflowers, and forbs are great choices to cultivate in a vineyard for supporting beneficial life and decreasing pests. There was a clearly noticeable increase in the estate vineyard's populations of green lacewings, brown lacewings, six spotted thrips, and other generalist predators of vine pests where blooming plants were maintained.

"By using select species of some plants, such as crimson clover, we found that cover crops could encourage tremendous levels of beneficial green and brown lacewings," Shaffer adds.

The goal for planting cover crop is two-fold: to benefit everything above ground — prevent soil erosion, encourage beneficial life forms, prevent dust, and improve vineyard appearance — and to enhance everything below ground, including better water infiltration. This allows minerals to be transformed into plant-available forms.

Shaffer adds that both beneficial life (predators) and pests (prey) are dependent on prefixed carbon as their sole dietary energy source.

"The trick is to develop a cover crop system in vineyards that tolerates low populations of prey that acts to sustain large populations of healthy beneficial predator organisms throughout the cropping cycle. This way, the cover crop is not only a critical component of soil erosion prevention, soil health, vine health, and fruit quality development, but is also an active component of above-ground pest damage prevention."

In addition to the carbon in living plant tissues, pollen and nectar are alternative sources of food for beneficial predators, and some cover crops offer more benefit than others. Examples are plants with long bloom cycles, such as alyssum, that support predators over the entire summer and winter, and plants with extra floral nectar sites, such as common vetch and bell beans, which offer large, easily accessible volumes of nectar.

Shaffer recommends maintaining various species of grasses and other plants that bloom at different times to provide continuous, overlapping, and diverse food for beneficial life in vineyards.

"Below ground cover crops are the most practical means to increase the soil's available carbon content which is the sole energy source for the living microbial biomass. The soil's living microbial biomass provides both biological and chemiophysical advantages to vines growing in soils with plant-parasitic nematodes.

"Cover crops deposit carbon into soils by their root's exudation and by organic matter when the roots die. North coast soils are generally seriously carbon-limited and without adequate annual return of organic

matter, these soils can become disease-conductive. Soil carbon is the sole energy source for the beneficial bacteria, fungi, and nematodes that act to control plant-parasitic nematodes.

"With synthesis of organic matter by plants and the carbon it contains, cover crops provide the most economical, practical, and effective energy source for the living microbial biomass that directly benefit grapevines with the seven essential functions performed by soil food web activity. Other non-living fractions of the soil, such as minerals, humic materials, and non-humic materials are also important sources of nutrition for the live biomass and soil food web functions in soil.

"Selection of cover crop species, used in conjunction with mineral balance and compost, can also act to decrease the negative impacts of plant-parasitic nematodes such as Dagger and Rootknot nematode in vineyards. Cover crop species can be selected to be either non-host or directly toxic to plant-parasitic nematodes. Non-host species are those that do not suit the plant-parasitic nematode's diet requirements and therfore weakens them.

"Cruciferous plants, such as white mustard contain glucosinolates that, upon decomposition in the soil, release isothiocyanate that can lower the population of plant-parasitic nematodes, weed seeds, and fungal pathogens."

### *Compost*

"Our goal in composting is foremost to recycle winery by-products and, upon application, to increase the vineyard's soil heath," says Shaffer. "The feedstock, processing, and curing are intended to create a compost that has disease-suppressive character. Windrow and static pile techniques are employed, with plenty of woody materials which feeds fungi in the compost and has a fairly coarse texture allowing for good air circulation and high populations of beneficial microbes in general.

"We know that, by biological analysis, the estate soils would benefit greatly by higher populations of diverse species of fungi. The compost is intended to inoculate the soil with fungi and to feed all the soil's macro- and micro-organisms, which then feeds the vine the best possible forms of nutrition."

A typical compost pile at Chateau Montelena contains about 65% pomace, about 10% chicken manure, 20% woody materials (such as wood chips and wood shavings from barrels), and about 5% compost from the previous pile to act as a starter.

"Fresh water plants from Jade Lake on the estate are harvested from time to time and added — that's a good inoculant," Shaffer says. "These water plants simply are another source of diversity, and a recycled material."


# Re-Building Soil Fertility for Grapes

**What kind of soil fertility** should a vineyard have for growing grapes? Some vineyards have been in production for many years. But grape growers tell us that, in spite of new varieties and good management practices, the quality and desired yields in some vineyards have either leveled off, or even may have begun to drop. Many clients tell us at the start of using our program that they just want to obtain what they used to achieve in terms of the crops they are growing.

**Follow the program to get results.** We have clients who sample every different type of soil in each vineyard every year and strive to do all that the soil test indicates needs to be done. For important areas, this may be followed by several leaf blade samples per year. Clients have been very complimentary concerning the increased soil and grape quality and the productivity of their "good soils" after three years of following recommendations for improving those soils. For grapes to reach this point, we strongly emphasize there is more to the program than just improving the level of fertility by addition of the required nitrogen, phosphorous, and potassium.

**For growing the best grapes** few soils have a readily available supply of all the required range of nutrients in the form that is useable by plants. Most growers will not be so blessed as to have soils that can be built-up or restored to excellent fertility for grapes in one or two years. Three years will be required in order to experience the full effects of this program. The better the grapes have been, the more this proves to be the case. Determine to set aside at least one or two areas and each year re-sample and follow through on the recommended program. Make the acreage large enough to buy the needed fertilizer materials in economical quantities. It doesn't have to be the entire acreage you tested, but it should be substantial enough to validate whether the benefits of fully implementing the program will justify the fertilizer costs.

**Building a soil fertility program** for grapes may sound appealing, but if there are still questions, consider sampling a sufficient acreage to learn what is shown to be needed. Do not just sample the worst areas; that will generally be the most expensive soil to correct. Choose a vineyard with **good soils**, some **average soils**, and some **problems** for testing. This will give an idea of what it will take in all of these various situations, and provide an opportunity to see what nutrients are there in your better soils as compared to the poor ones. Some growers will also include their very best vineyard soil — the one they wish all their grapes were growing on — but with no hint of which submitted sample it is. When you have outstanding results in the vineyard, it will show up on the soil analysis.

**Call 573-683-3880** or e-mail to: office@kinseyag.com, or visit the "Contact Us" page at: www.kinseyag.com, and let us know if this is the type of soil-building program you feel could be helpful.

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**To promote more even bud break and shoot growth, Vella has developed a short cane vertical system on a recent 6x8 vineyard development of Cabernet Sauvignon. The vine is trained to a 36-inch T cordon consisting of four spur and cane positions. The 6- to 8-bud canes are tied to a fruiting wire six inches above the cordon wire.**

Soil amendments including rock powders such as calcium phosphate, basalt or calcium carbonate are also excellent compost feedstocks.

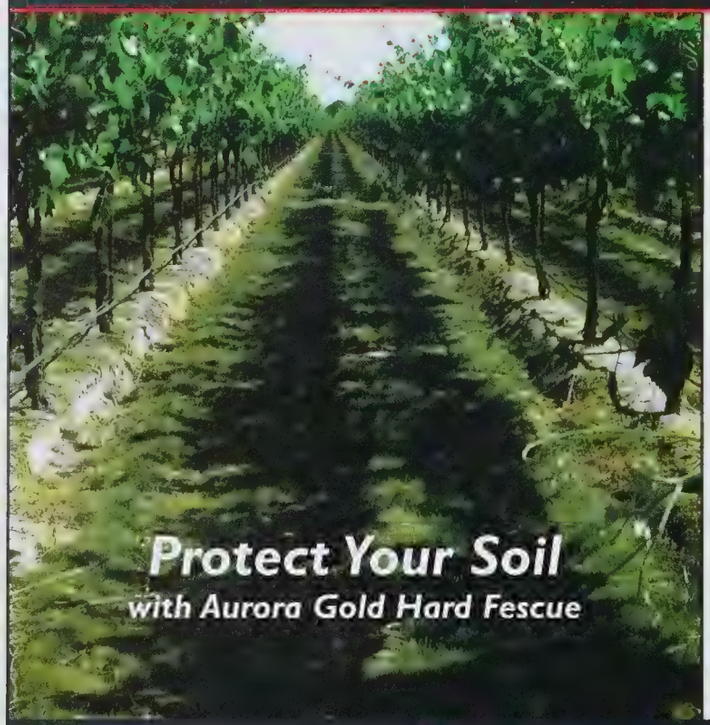
"There are four groups of functional living organisms (bacteria, fungi, nematodes, and protozoa) referred to as the 'living microbial biomass' in soil that provide seven critical benefits that are unavailable from any other means," says Shaffer. "Well-made and fully-cured compost increases the health of the living microbial biomass and benefits vines in seven ways that are critical for vine health."

### *Mineral balance*

"For best grapevine growth, we want minerals in soil to be balanced which refers to both the ratio of the major cations and anions to each other in soils and also the overall poundage of all essential minerals in soil. Managing mineral balance requires the use of wet chemistry soil analysis to determine the relative balance that currently exists and improves the predictable outcome of soil inputs.

"Mineral balance and the living microbial biomass in soils controls the pH, rate of mineralization, organic matter decomposition, soil structure, vine health, and significantly affects the qualtiy of fruit production. Soil minerals vary greatly in content in soils due to parent materials, farming practices, leaching or fixation. Soil mineral balance is generally better near the sur-

ELIMINATE THE COMPETITION




Usually competition is healthy, but in vineyards, unwanted grasses and weeds steal water, nutrients and sunlight from your vines. Typically, controlling weeds requires costly chemicals that leave your soil barren and susceptible to run-off and erosion.

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*After an eight-ounce rate application of glyphosate, Aurora Gold thrives while weeds are eliminated. (Photo taken 60 days after spraying.)*

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face of the soil and is less desirable deeper in soil.

"For example, the alluvium and sedimentary soil at the estate are high in potassium due to decomposition of a potassium-rich volcanic rock called Rhyolite that formed from post shield stage lava from Mt. St. Helena. Grapevines and fruit require good potassium availability for their best quality and Chateau Montelena soils provide luxury amounts of potassium.

"However, potassium is antagonistic to calcium, boron, and manganese that are also required for high-quality grapes. By measuring the soil's mineral balance, we can predict the right amounts of calcium, boron, and manganese required to 'balance' the high potassium. Here again, soil organic matter plays a critical role in buffering the negative effects of an excessive mineral and by chelating minerals into forms that are most usable by grapevines.

"Minerals in the soil have antagonistic effects on each other. Minerals in soils do not exist in a vacumn and are subject to chemical and biological forces that either increase or decrease their availability to plant roots. By following scientific guidelines to 'balance' the essential soil minerals, vines produce a higher degree of fruit quality and elevated disease resistance or tolerance."

### Soil life

Cover crops, compost, and mineral balance act synergistically to elevate soil health which support healthy earthworm populations. Earthworms are indicator species of soil health.

Soil treatments have increased earthworm activity in the soil at Chateau Montelena. "We try to delay any required spring tillage until the earthworms have moved deep into the soil as they follow the moisture downward," Shaffer explains.

Benefits of earthworms, the largest animal in the soil system, are profound, notes Shaffer. "They accelerate decomposition of organic matter, and they make holes deep in the soil, creating a path for water and air." Earthworms improve soil structure, consume plant-parasitic nematodes, and they change minerals into forms more effective for root uptake.

"The more you learn about earthworms, the more you protect them," Shaffer declares.

Earthworms are an important component in our effort to limit mechanical tillage — because the earthworms actually are tillers. "They work 24 hours a day, seven days a week with only the cost of some cover crop residues and good mineral balance," he concludes.

### Grapevine selections

Vella reports that 16 different blocks of Cabernet Sauvignon are planted at Chateau Montelena, and because of

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Aristotle added to the four elements—fire, earth, air and water—
a fifth element of extreme purity derived from the sky and the stars: Quintessence.
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low vine vigor, the grapes produce an earthy, deep, dark-colored wine. Six acres planted on heavy clay, sedimentary soil have more vigor and the vines yield about 20% more fruit than the rest of the block. Vella notes that the wines produced from these vines are more typical of Napa Valley wine. Hillside blocks on the volcanic, rocky and well-drained soils of the higher elevations of the Chateau Montelena property produce a low-yield but intensely concentrated fruit.

The majority of the Montelena vines are more than 30 years old, and although the trend when they were planted was to use AXR-1 rootstock, the winery chose St. George, and did not experience a phylloxera problem. In 2002 and 2003, 10 acres of Chardonnay in Oak Knoll were replanted with 101-14 rootstock and Clone 4 and 17 scion-wood. At the Home Ranch in 2001 and 2003, eight acres were replanted with 110-R rootstock and clone 337 Cabernet Sauvignon.

The winery has nearly 63,000 vines, ranging from 454 to 906 vines per acre. Eighty percent of them are from the original planting (early 1970s).

Vineyards were originally planted 12x8, typical for 30 years ago, but replanting is 8x6, mostly on vertical trellising. Montelena has vertical, lyre, and two-wire trellising, depending on location, soil type, and varietal.

There is one six-acre block in the Montelena Estate Vineyard where Vella could not control the canopy properly, resulting in poor quality grapes, that has been converted to a lyre system and now "the grapes make the cut every year."

Extensive leaf removal is done on head-trained vines to open up the center, but not much de-leafing on the canes. Leaves are removed after bloom, again when the berries are pea-size, and one more time around veraison. "If it's cool or we have a late rain, we'll do another pass on the Zinfandel and Primitivo," adds Vella.

Leaves are pulled from all sides. "We've had more burn on the morning side than on the afternoon side," he notes. "But every vine is different."

Vella does cane pruning because it removes more wood and reduces potential Eutypa and Pierce's disease. "Our 30-year-old vines are more susceptible to Eutypa," he says. "We prune as late as possible — we start the latter half of December. We wait as late as we can."

There's no specific formula for pruning. The crew looks at each vine individually and prunes to an average of 1½ to 1¾ canes per vine. "I'd like to average two," Vella says, "but it all depends on the previous year's growth."

### *Farming*

Chateau Montelena practices sustainable farming. Insect infestations have never been a problem according to Vella, but he has about 750,000 ladybugs released in late spring, "just to make myself feel like I'm doing something." In addition to eliminating the use of soluble fertilizers and relying on the pomace, wood, manure recipe compost, Vella refrains from using herbicides, relying on an old-fashioned French plow where possible to keep the vineyard free of weeds.

His crew makes one pass with the plow in the spring, preferably before bloom, but always after bud break. Suckering is done during leaf removal, and, during this time, the crew also looks for weeds. The first suckering is done on the trunk and head before bloom.

A mower, hoe plow, and disc are used to handle the cover crop. On the valley floor, the cover crop is mowed after bud break, when weather allows. "We may wait longer than others," Vella acknowledges, "but we will not allow tractors on the soil when the ground is wet."

The crew discs between four and eight inches deep, depending on how hard the ground is, and on the hillsides it's necessary to mow as often as four times per year. "We have to irrigate the hillsides, so we get more weeds there," Vella notes.

No irrigation is given to most Cabernet Sauvignon vines on the valley floor, but Vella has experimented

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with irrigation on hillsides to get the right formula. "It's not on a schedule," he says. "Just when it looks ready." He may water up to two weeks before harvest. Typical irrigation for rocky hillside blocks is 6 to 7 gallons/week.

The first thiolux application is after bud break, the second is just before bloom. A typical season would include two applications of thiolux and two or three sulfur dustings.

For frost protection, Chateau Montelena has 13 wind machines and about 25 acres under sprinklers. Hillside blocks are unprotected. Vella plans on a 60-day window for frost after bud break, and in 2004, used wind machines and sprinklers only three times. But in 2005, they came into play 11 times.

### *An intangible asset*

In addition to the viticulture practices employed by Chateau Montelena, another element plays a major role in making the world-class wines for which the winery is known.

A long and special relationship between Vella and winemaker Barrett brings an intangible asset to the winery. Vella and Barrett were classmates at Fresno State and developed a close friendship. Vella graduated with dual degrees in enology and viticulture and afterwards worked as the only full-time employee for a small winery in Napa Valley, handling every aspect of the winegrowing and winemaking process.

In 1985, when Chateau Montelena's vineyard manager, John Rolleri, was about to retire, Barrett called Vella and offered him the job, saying he was looking for an experienced vineyard manager who also had a winemaker's perspective. Vella wondered if good friends would be able to work together without ruining the friendship, but he decided to give it a try, and the relationship has worked perfectly and the friendship survives.

The two trust each other implicitly and work very closely together when harvest comes. Vella and Barrett make a joint decision on when to pick, and they have established what they call a "veto power" voting system. If they do not agree, they hold off picking, because both believe it is better to wait than pick too soon.

### *Conclusion*

All these factors — excellent vineyard locations; careful selection of rootstocks and clones to match the soils and climatic conditions of individual blocks; soil management with annual soil analyses; cover crops; and the close working relationship between vineyard manager and winemaker — work together to produce the high-quality grapes that allow Chateau Montelena to sell its Napa Valley Cabernet Sauvignon for $40, estate Cabernet Sauvignon for $125, and Napa Valley Chardonnay for $35. ■

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# Mechanization and Terroir: Are they compatible?

BY Stefano Poni
Istituto di Frutti-viticoltura,
Università Cattolica del Sacro Cuore
di Piacenza, Italy

Vineyard mechanization is increasingly important to grapegrowers around the world, but the question remains whether fully mechanized vineyards can produce top-quality grapes. In some Old World countries, such as Italy, for example, prevalent opinion persists that pruning and harvesting by machine cannot produce the grape quality attained by hand labor.

No one would argue that mechanization is more efficient than hand labor and that production costs are much lower as a result, but can mechanization truly be counted as delivering maximum efficiency if grape quality suffers?

Since mechanization clearly interacts with many of the key factors identified with terroir, and since terroir today is associated with the general concept of recognizable grape quality, an analysis of the interaction between vineyard mechanization and terroir can help us answer these questions.

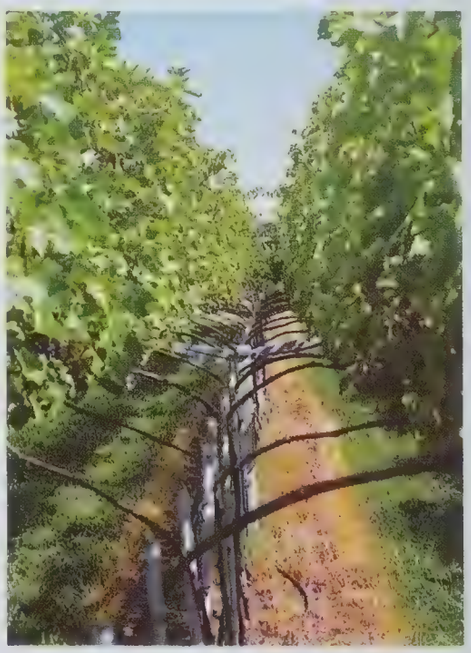
To illustrate how mechanization interacts with "terroir," a rigorous definition of the latter term is needed. We believe that "terroir is the ecology of a wine — the total, inter-related environment wherein a grapevine is cultivated for the purpose of making wine. Key factors include, but are not limited to, cultivar type, soil, climate, vineyard location, planting density, training system, pruning philosophy, and the cultural and social milieu wherein the whole enterprise takes place."

Although Richard Smart (1996) stated that it is almost impossible to establish a direct relationship between wine quality and soil composition or content of any nutritive element, there is evidence that the soil physical properties that regulate water supply to the vine are a key factor for a great terroir.[41]

Light soils, which drain freely and are associated with deep vine roots reaching a not too deep water table, produce those conditions likely to lead to the ideal state of mild water stress with vine growth stopping, on schedule, around veraison. This is a nice example of naturally regulated vine balance, leading, in turn, to good to excellent grape quality.

However, if the above definition of "terroir" holds, even the lowest priced wine can be representative of a terroir. Figure I (page 47) shows the fractional distribution (year 2003) of exported Italian wine as a function of price per litre.[26] The narrow pyramid shows that only 2.9% of the total value is sold at prices higher than €6/L, whereas more than 65% of the value goes to prices lower than €3/L. Therefore, restricting the term terroir to the top price would basically eliminate the need to investigate the interaction between "terroir" and "mechanization," since those highest priced bottles are quite likely coming from prestigious sites where labor cost is not, at least not yet, a priority.

Note that we have asserted that choices of vine spacing or training system also help define a terroir. If we



A view of the COMBI training system, featuring split canopy and upright shoot growth. The trellis is adapted to vertical mechanical harvesting.

imagine that a high-density vineyard trained to gobelet in the south of France is removed and replanted with wider spacing with a very different trellis, could we say that the wine coming from that vineyard is still the expression of the same terroir? Doubtful.

One complication of defining terroir is whether or not the definition holds for both the Old and New World. To simplify, it can be stated that Old World terroirists aim to make wines that express the "typicity" of a vineyard site by putting a major emphasis on soil effects. In the New World, the terroir effect has been somewhat disregarded, and it is still viewed as a more pragmatic approach to improving quality.

Another important question rises: Are both Old and New World facing viticultural changes that will soon affect the relationship between terroir

**Early mechanical leaf removal on one side of a COMBI trellis (top), and outcome of machine passage (bottom).**

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**Table I: Composition of mechanically harvested grapes, according to variety and harvest principles.**

| | Harvesting principle | Berries (%) | Bunch or part of (%) | Free must (%) | Debris (%) |
|---|---|---|---|---|---|
| White Cultivars* | Horizontal shaking | 86.1 | 3.5 | 9.3 | 1.1 |
| | Vertical shaking | 80.5 | 15.7 | 3.6 | 0.2 |
| Red Cultivars** | Horizontal shaking | 81.8 | 9.9 | 6.8 | 1.5 |
| | Vertical shaking | 73.0 | 23.7 | 2.9 | 0.4 |

*Tocai Fruilano, Chardonnay, Pinot Blanc, Verduzzo Friulano, Verduzzo Trevigiano

**Pinot Gris, Pinot Noir, Merlot, Carmenére, Cabernet Sauvignon, Cabernet Franc, Raboso Piave, Raboso Veronese

[Data re-worked from Intrieri and Poni, 2004.]

and mechanization? The answer is yes, although these changes have different rationales. In the Old World, the increasing cost of hand labor, often associated with difficulty finding skilled workers (mostly for winter pruning), will indeed produce an increased interest in mechanized grape production systems. It is a trend that will be hastened if this process is paralleled by lower wine prices in the market.

The New World is already highly mechanized (Australia, for example). This high degree of mechanization is facilitated by, among many factors, vineyard size. Some New World vineyards are hundreds of hectares in size, while in the more traditional parts of Europe, some vineyards are fractions of a hectare. However, when very large vineyards are machine-harvested in Australia, different terroirs are likely blended, and their individual wine-making potential is diluted or dispersed.

Given that wine quality is enhanced by fermenting homogeneous lots of grapes and that variation in batches of delivered grapes is mainly due to soil,[42] several large Australian wineries are doing soil mapping to locate zones where factors that contribute to terroir are similar, such as readily available water, or they are considering the use of "precision viticulture."[24]

Precision viticulture uses global positioning systems (GPS) in association with geographical information systems (GIS) to make it possible to divide vineyards into management grids, each of which is quantified and treated separately. Technology is already available to build sensors that record specific information from each

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**Table II: Influence of manual and mechanical pruning on vegetative growth, yield and grape quality of "Croatina" vines.**

| Source of variation | Nodes/ vine | Budbreak (shoots/ node) | TLA/ vine ($m^2$) | Yield/ vine ($m^2$/kg) | TLA/ yield ($m^2$/kg) | Soluble solids (°Brix) | Anthocyanins (mg/g FW) | Phenols (mg/g FW) |
|---|---|---|---|---|---|---|---|---|
| HP | 37.5 d | 0.91 a | 4.79 b | 2.82 c | 1.70 | 20.7 a | 1.34 a | 2.96 a |
| SMP-SF | 50.5 c | 0.89 a | 5.02 b | 3.48 b | 1.44 | 20.4 ab | 1.34 a | 2.93 a |
| SMP-LF | 60.0 b | 0.81 b | 5.88 a | 3.67 ab | 1.60 | 20.4 ab | 1.28 a | 2.95 a |
| MMP-LF | 75.2 a | 0.74 c | 5.10 b | 4.19 a | 1.22 | 19.7 b | 1.18 b | 2.79 b |
| Significance[z y] | ** | ** | * | * | Ns | * | * | * |
| *Pruning x year interaction*[y] | ns | ** | * | * | ns | ns | ns | ns |

[z] = Means separated within columns by Student-Newman-Keuls test
[y], *, **, ns = Significant at $p \leq 0.05$, 0.01, or not significant, respectively
[Data averaged over 2000–2003. Data taken from Poni, et al, 2004.]

vine in order to map vigor, Brix, phenols, and more.[39] This has an impact on mechanization, since machines are being modified to incorporate computerized monitoring devices and sensors.

One example is GIS-driven mechanical harvesters, which can adjust speed or slapper frequency according to a maturity gradient along a vine row. It appears that the New World is moving quickly toward these vineyard management techniques in order to compete with the Old World in terms of terroir expression.

### *Mechanical harvesting and terroir*

The natural link between mechanical grape harvesting and terroir expression is the effect on grape and wine quality. It would appear that

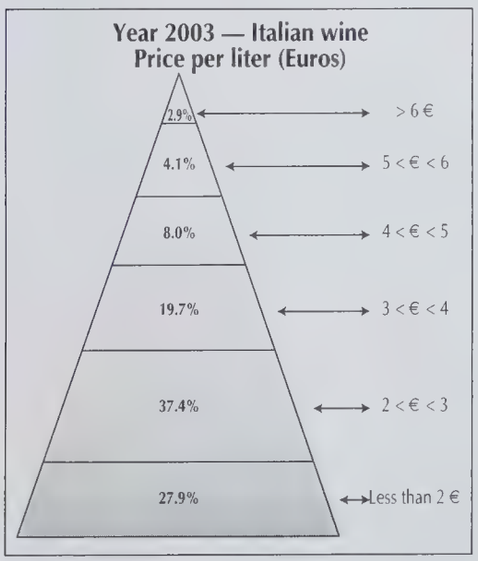


**Figure I. Percentage distribution of Italian wine export (year 2003) valued as €/L.**

important viticultural nations have a quite different perception of what this means. Despite differences in tradition, range of varieties, and cultural conditions, Australia, France, and Italy are recognized worldwide as producers of quality wines, yet mechanical harvesting in Australia is approaching 100% of total vine acreage,[29] in France it is now above 75%,[4] and in Italy about 8%.[15,17]

Why such large variation? Mechanical harvesting in Italy is hindered by small farm size and larger variability in cultivars, training systems, and sloping conditions.[2,13] In Italy, many winemakers still believe that mechanical harvesting of grapes can spoil the value of terroir. Under such circumstances, it is crucial to look at each condition that objectively makes mechanically harvested grapes a potential source for high-quality wines.

Successful mechanical harvesting is based on optimal choices in regard to the following issues:

1. Driver skills, machine setting, and speed,
2. Trellis design and material (type of posts, wires and accessories),
3. Degree of integration between trellis structure and harvester,
4. Stage of grape maturity, incidence of rot, pre-harvest weather course,
5. Cultivar suitability assessed as ease of berry detachment and berry skin thickness,
6. Harvesting technique — vertical or horizontal shaking.

The quality of mechanically harvested grapes depends on fine tuning

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of the above factors; however, it appears that items #3 and #6 are the most critical. Indeed, in item #3, too often a harvester is used in an existing vineyard simply because the maximum post height fits the tunnel size. Little attention is paid to the position of fruiting area in relation to shaking organs and intermediate posts, which in turn, typically leads to increased grape losses.

The reverse process is recommended: Vineyards should be designed and planted for potential mechanical harvesting, so the actual use of machines would simply become an economic decision.

Harvesting technique (vertical or horizontal shaking) is the second key factor about which there seems to be some contradiction. Horizontal shaking, such as use of over-the-row machines equipped with slappers to "beat" the vine row asymmetrically and, hence, detach the berries, is by far

the most widely used throughout the world.[23]

The popularity of this harvesting method is based on the fact that even existing vineyards (such as hedgerow type with vertical shoot positioning and maximum post height not exceeding 2.2 to 2.3 meters above ground) can be more or less successfully mechanized.

However, the literature is in agreement that — especially on cultivars having low susceptibility to mechanical harvesting, such as Pinot Gris, Trebbiano, Moscato, and Prosecco — vertical shaking can consistently reduce juice loss because its more gentle action on the canopy wall allows a portion of the grapes to be detached by inertia with no or minimum contact with the rotating spiked wheel (Table I).[5,13,22] Yet, this method is suitable only for those training systems allowing an up-down oscillation of the wire supporting the cordon, according to the guidelines provided by Nelson Shaulis et al. (1960) on the adaptation of the Geneva Double Curtain (GDC) trellis to mechanical harvesting.[43]

If "terroir" is to be identified with typical training systems (as is the case with the spur-pruned cordon in the Brunello district), a good example of integrating terroir and mechanical harvesting to achieve quality would be to modify the trellis to make it suitable for a vertical-shaker harvester. This can be done quite easily by training to an arched vine trunk and using devices that allow vertical oscillation of the main wire.[15,17]

Research has gone further and new training systems like the COMBI (the Italian "Combinato" which is a blend of two training systems: spur-pruned cordon and GDC) have been designed to merge many positive features; physiological and structural, in a single trellis, such as suitability to vertical mechanical harvesting, canopy division to accommodate high vigor conditions, high investment on a per-acreage basis (rows are planted at three meters between vines for 6,666 meters of productive cordon/ha), and VSP canopies with upright shoots to allow better light exposure of the most functional apical leaves from veraison onward.[15]

Another aspect of mechanical harvesting directly linked to quality and often neglected is composition of harvested grapes. There is no doubt that, especially for white must, which is more susceptible to oxidation, a mass made of mostly intact berries is preferable to a juicy product.

However, the application of vertical harvesting has highlighted that, within Vitis vinifera L., there is much variability among cultivars in terms of composition of machine-harvested grapes. For example, COMBI-trained Bonarda and Shiraz grapevines have shown a lower fraction of mass harvested as single berries and,

conversely, an increase in the portion of partial clusters.[17]

If there is a concern about mechanical harvesting of V. vinifera, it is juice loss at the pedicel's detachment zone. Having a fairly high percentage of cluster parts (rather than single berries) is indeed a positive feature that ought to be pursued.

There is some evidence that, in addition to a varietal effect, the amount of grapes detached as cluster parts depends upon the harvesting method (horizontal shaking diminishes this fraction), ripening stage, and pre-harvest weather. In some years, maturation of the cluster peduncle is partial, and this creates an abscission zone, which makes it possible to detach the whole cluster with machine vibrations.

### *Winter mechanical pruning and terroir*

The perception of mechanical winter pruning in the context of "terroir" is again quite different, depending upon the viticultural tradition of the given country. In Australia, for example, the technique of minimal pruning has been successfully applied in several regions.[7]

In Old World countries, such as Italy, there is an assumption that a higher node number left on the vine by non-selective mechanical pruning as compared to hand pruning would, in turn, lead to higher yield and/or more pronounced biennial bearing and, hence, decreased or uneven quality.

The typical view of a cordon mechanically pruned for several years, and showing the accumulation of old wood, does not seem to fit with the concept of terroir, which traditionally emphasizes the need for "clean" vines managed with a fairly small node number.

Today, this interpretation of the relationship between terroir and mechanization of winter pruning seems to be

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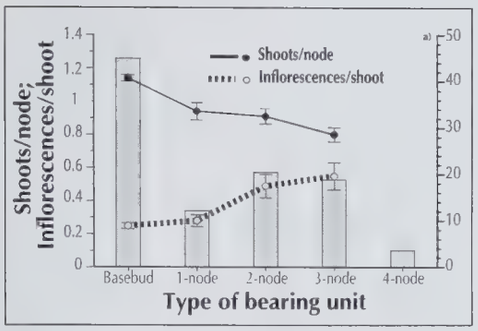


**Figure II. Frequency distribution (gray histograms), mean budbreak (shoots/node) and fruitfulness (inflorescences/shoot) for each type of bearing unit left on cordons of cv. Croatina (Vitis vinifera L.). Data have been averaged over four years of observations (2000–2003) and different pruning regimes (see Table IV for explanation). [Taken from S. Poni, et al, 2004.]**

too rigid. Changes in canopy physiology caused by an increase in node number following mechanical cuts (with or without manual follow-up) are far more complex.

Increasing node number per vine usually leads to an increase in vine "capacity" (total effective leaf area per vine), which can counteract the expected yield increase and, hence, act as a buffer for maintaining similar quality. Likewise, the higher node number reduces the vigor of individual shoots (often excessive under a low-node number pruning regime), therefore determining more favorable conditions for sugar accumulation after veraison.[45] Then, too, the question should be probably restated as: Can mechanical winter pruning be a tool to improve the expression of terroir?

The answer could be easily found by revisiting the large amount of research on mechanical pruning of grapevines published over the last 30 years.[7,8,9,11,12,14,21,33,36,38,40,44] However, here we shall summarize a specific experience involving Croatina (*Vitis vinifera L.*), a cultivar marked by the low fruitfulness of basal buds (varying between

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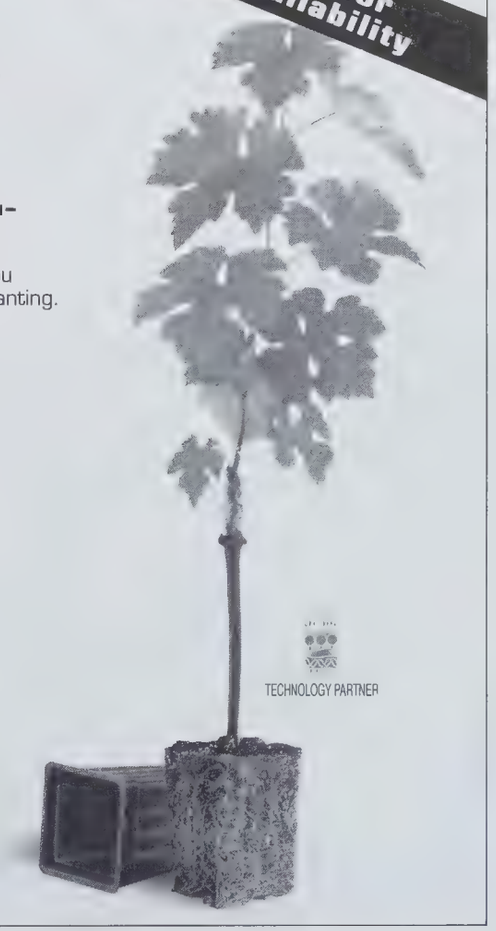

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0.3 to 0.6 inflorescence/shoot within the 1- to 4-basal nodes) (Figure II)[33]

Four pruning treatments — hand pruning (HP), short mechanical pruning followed by severe or light manual follow-up (SMP-SF; SMP-LF), and medium mechanical pruning followed by light manual follow-up (MMP-LF) — were compared in a 10-year-old "Croatina" vineyard trained to high free cordon and planted at 1.1m x 2.5m.

Mechanical hedging was performed by a cutter bar unit side-mounted on a tractor with an over-row reverse-U cut profile. Manual follow-up was performed by two crewmen with pneumatic shears working from a tractor-drawn platform.

"Severe" and "light" follow-up were defined by the number of machine passes per row (two and one, respectively), thereby allowing the crew more or less time for shortening and/or thinning of machine-pruned wood. "Short" mechanical pruning was defined as cuts made as close as possible to the cordons; MMP-LF was set by maintaining the cutter bars at approximately 10 cm above and beside the cordon.

A summary of the main results recorded in years 2000 to 2003 is in Table II and summarized below:

A. SMP plus hand finishing, retaining 50 to 60 nodes/vine, achieved about 25% higher yield than HP at similar quality and 50% time saving;

B. Yield compensation was manifested here primarily as reduced budbreak beyond the threshold of 60 nodes/vine and was indeed aided by the natural low fruitfulness of the basal nodes of this cultivar;

C. The breakpoint in this study was represented by MMP-LF (less than 60 nodes/vine), which started to show a depressant effect in vine capacity paralleled by a contraction of soluble solids and anthocyanins;

D. Mechanical pruning here turned out to be an excellent tool to identify the vine balance, which sets the maximum cropping level at the desired quality.

Point D best clarifies how mechanization can affect "terroir" expression. The highly competitive wine market demands a balance wherein remunerative yield, desired quality, and reduced costs can coexist.

There are several cases in which growers artificially limit the yield level of their vineyard through either severe pruning and/or cluster thinning due to the worry that grape quality may become impaired. However, certain "terroirs" could bear some yield increase without detriment to quality simply because the site potential allows it.

Mechanical pruning is an exceptionally viable tool for identifying the yield threshold beyond which quality starts to decline, a factor that, in our view, is

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a primary component of the terroir concept.

### *Summer mechanical pruning and terroir*

At first glance, the link between mechanization of summer pruning and terroir seems less direct than mechanical winter pruning simply because summer pruning might also be a *"one-time"* operation.

One example is shoot trimming, which may be needed once or more over a warm and wet season for vegetative growth but may not be necessary if the season develops cool and dry.[25] On the other hand, we are aware that summer pruning causes significant changes in canopy architecture and physiology and in the compositional and sensorial traits of the grapes.[30] Our attention should thus be directed here to those mechanical summer pruning runs that are performed every year to induce specific grape quality traits so as to contribute to the expression of a terroir.

Over the last several decades, there have been impressive advances in the field of mechanical summer pruning.[40] Many of the world's trade exhibitions have a large array of machines suitable for summer pruning intervention (shoot trimming and positioning, bud, shoot and berry thinning, de-suckering, tying, leaf removal). The only exception is cluster thinning, which is still primarily manual.

Two of these operations — shoot trimming and leaf removal — are particularly effective in modifying a natural terroir, which due to intrinsic unfavorable climate features (too warm or too wet), is considered a non-premium wine area.

#### SHOOT TRIMMING

Shoot trimming is one of the easiest operations to mechanize, and it can be performed in about one to 1½ hours/ha with machines mounted either with a cutter bar or rotating knives.[12] A fundamental distinction needs to be made between shoot-trimming on traditional VSP hedgerow trellises or on free-hanging canopies (such as high single-wire trellis).

On a VSP hedgerow trellis, mechanical trimming has to be performed when the shoots begin to outgrow the top wire and manifest the tendency to bend downward. Cutting-severity and timing become variables of scant flexibility. In fact, if the cutter bar has to operate above the top foliage wire and the trellis is correctly managed (canopy height of at least 1 to 1.2m above the main wire), a minimum number of main leaves likely suitable for adequate ripening is automatically retained and the timing is very much determined by the shoot-growth rates imposed by the weather prior to pre-trimming.

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**Table III: Effects of the defoliation treatments on cluster weight, grape quality, and leaf-to-fruit ratio in Barbera (pot study) and Trebbiano Romagnolo (field study) grapevines.**

| | Barbera (pot study) | | | | | Trebbiano (field study) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Cluster weight (g) | Soluble solids (°Brix) | TA (g/L) | Total anthocyanins (mg/g FW) | Final LA/yield ( $cm^2$/g) | Cluster weight (g) | Soluble solids (°Brix) | TA (g/L) | Final LA/yield ($cm^2$/g) |
| Control | 159 a | 17.2 b | 10.8 a | 0.76 b | 15.1 b | 17.2 c | 17.2 c | 5.8 b | 7.8 |
| I – 50% | 112 b | 19.6 ab | 8.3 b | 0.98 a | 21.8 ab | – | – | – | – |
| I – 100% | 113 b | 20.5 a | 8.7 b | 0.90 a | 17.9 ab | 142 b | 19.6 a | 5.8 b | 10 |
| II – 50% | 99 bc | 21.4 a | 8.4 b | 0.98 a | 23.6 ab | – | – | – | – |
| II – 100% | 87 bc | 19.2 ab | 9.5 b | 1.02 a | 23.2 ab | 167 b | 19.1 ab | 7.3 a | 7.7 |
| I – II – 50% | 83 c | 20.1 ab | 9.0 b | 0.99 a | 29.5 a | 180 b | 18.6 b | 6.4 ab | 9.0 |
| Significance[1] | * | * | ns | * | * | * | * | * | ns |

[1] = Mean separation within column by DMRT.
ns, *, ** = non-significant, significant at 5% and significant at 1%, respectively.
[Taken from Poni, et al, 2005.]

Yet, this operation represents an important diagnostic tool for investigating vine balance in a vineyard: the ideal vegetative regrowth would be represented by some laterals developing mostly in the apical part of the trimmed stem, which on one hand, should grow enough to reach maturity around veraison and, on the other hand, not grow too much to make a second (or even a third) trimming necessary with the attendant risk of excessively prolonging vegetative growth.

Mechanical shoot trimming performed on free-hanging trellises has a much greater impact than on a VSP hedgerow trellis in altering grape characteristics and, hence, terroir expression. This is because canopy characteristics (direction of shoot growth, leaf and cluster microclimate, leaf demography) are much more drastically modified by this intervention than when trimming VSP canopies. Indeed, a shoot trimming applied to a single-wire trellis by mechanical removal at bloom of a few apical leaves from a still mostly upright canopy results in key modifications as follows:

I. A more upright growth habit is induced with better light penetration in the cluster area and basal shoot zone. Yet, the clusters are somewhat screened by overlying leaves and this contributes to a sort of "intermediate"

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cluster microclimate (such as prevalent diffuse light enriched with occasional sun flecks), which has proved to be best for pigment accumulation in a few red varieties.[10,35]

II. Early trimming triggers lateral formation that, if well balanced, leads to a change in leaf demography (rejuvenation), which is able to maximize the fraction of functional, yet non-senescing, leaf area over the total at veraison. A younger grapevine canopy over the ripening period would mean not just higher photosynthetic activity but even more chances to synthesize tartaric acid, which is notoriously produced primarily by immature organs (namely young leaves).

Given these modifications, it is conceivable that grapes harvested from the same plots, and differing only for presence or absence of trimming, would lead to a final product that might mimic differences related to terroir.

However, published reports have highlighted that the early cut on which this technique is based triggers unpredictable lateral regrowth following trimming.[30,31] This concept is better clarified in Figure IIIA–D, where data from a three-year trial on Pinot Noir/3309 trained to high single-wire cordon are reported.[32] The canopies were trimmed yearly at either seven (T 7) or 11 (T 11) main leaves at pre-bloom as compared to untrimmed canopies (control). Mechanical shoot trimming was usually performed in late May, when the majority of shoots were still erect.

While yield levels were similar between treatments (no significant year x treatment interaction for this parameter), the weather markedly influenced post-trimming lateral formation, which was weak and moderate in 1999 and 2001, respectively, and strong in 2000 (Figure IIIA).

As a result, in 1999 and 2001, the leaf-to-fruit ratios, calculated on a per

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vine basis (Figure IIID), were lower than one $m^2$/kg of fresh mass in both trimmed treatments, and this corresponded to lower Brix and total anthocyanins as compared to untrimmed vines (Figures IIIB,C). These results send a warning signal about the "high risk rate" of this technique, which should be aided, whenever possible, by supplemental irrigation as a tool for correction of weak growth in dry years.

### Leaf removal

Leaf removal of the fruiting area, whether manual or mechanical, is one of the most frequently applied summer pruning operations in winegrape growing.[18,20,27,28,37,46] Although this cultural practice may have different goals, it is usually performed between fruit-set and veraison on high density canopies to improve light exposure and air circulation around clusters, with remarkable benefits in terms of pigmentation and tolerance to rot.[3]

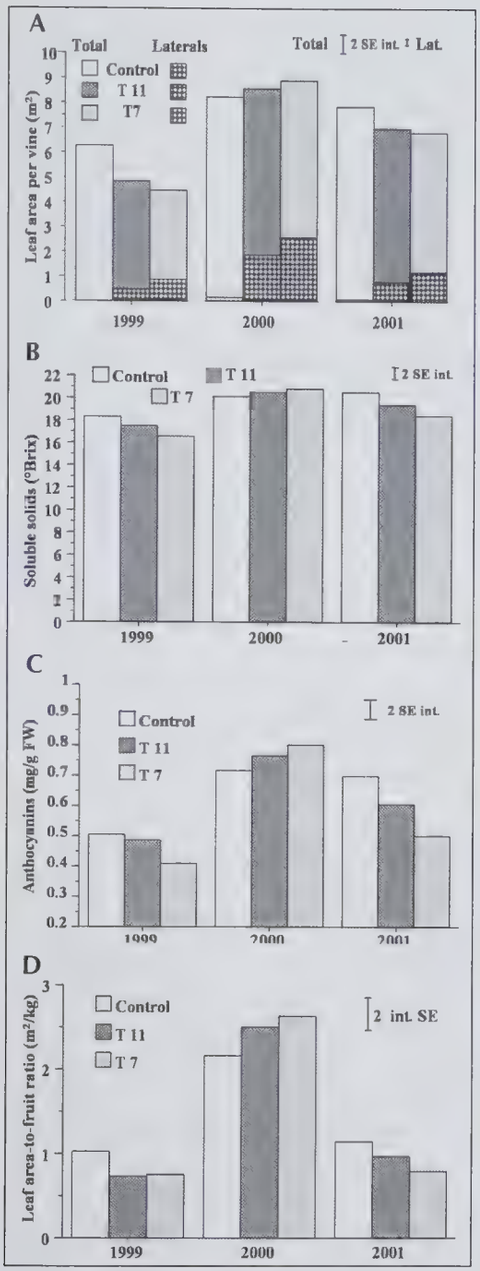


**Figure III. Effects of early shoot trimming (7 or 11 leaves retained on main shoot as compared to untrimmed) on total leaf area development (main + lateral), soluble solid concentration, total anthocyanins, and leaf-to-fruit ratios of Pinot Noir grapevines trained to high single wire. [Taken from S. Poni et al, 2002.]**

Yet, improved quality is not a constant of leaf removal studies, and when present, it does often appear to be an indirect consequence of improved cluster microclimate.[37] Excessive leaf removal resulting in overly exposed clusters has led to lower berry color in red varieties.[35]

Recent research by P.R. Petrie et al. reports that leaf removal from the lower quarter of the canopy during the lag phase of berry growth caused a significant decrease of whole-vine photosynthesis even on a per-unit leaf-area basis, thus suggesting that the lower portion of the canopy contributed more than the upper portion to the whole-vine carbon budget.[28] Likewise, the effects of leaf removal on yield are quite variable, depending upon timing and severity.

Since it is very well known that carbohydrate supply at flowering is a primary determinant of fruit set,[6] early leaf removal (within four weeks after flowering) quite typically reduces

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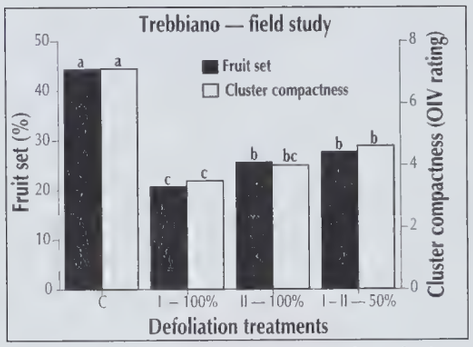



**Figure IV. Effects of early removal on fruit set and cluster compactness in Trebbiano vines. Table V. I = pre-bloom defoliation. II = beginning of fruit-set defoliation. 50%: removal of one every two leaves the basal shoot zone (node 1 to 8). 100%: removal of all leaves within the basal shoot zone (node 1 to 8). [Taken from S. Poni, et al., 2005 (*Acta Hortic.* in press).]**

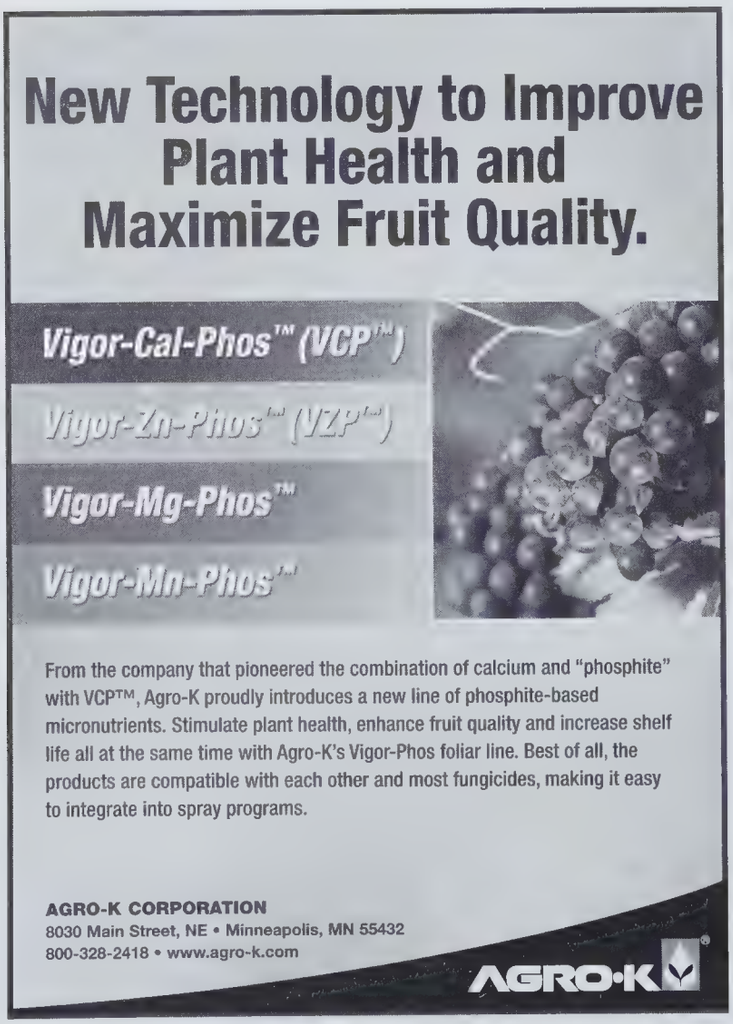
berry weight and the amount of total sugar per vine.[18,20] However, if leaf removal is performed later or at a lesser level, yield might show either no significant changes or even occasional increases as compared to non-defoliated vines.[3,46]

Let us return to the issue of terroir and, hence, grape quality. It does appear from the above literature review that the variability of effects brought about by leaf removal is too high to note that the same can be consistently used to ameliorate quality. However, more recently, a particularly early leaf removal (pre-bloom and/or first week after fruit set) carried out on the basal shoot zone has been tested on highly productive varieties bearing big, compact clusters to verify whether the expected decrease in fruit set, and hence cluster compactness, is also accompanied by enhanced quality.[34]

Preliminary results — albeit still in reference to controlled (manual) leaf removal applied at 50% and/or 100% on the one- to eight-node shoot zone in cvs. Barbera and Trebbiano — has led to a spectacular reduction in cluster compactness (Figure IV) and, most important, to increased quality (higher Brix in both varieties and higher anthocyanins in Barbera) (Table III).

Improved quality in defoliated vines is partially due to the increase in leaf-to-fruit ratio (shoot basis) induced by a more than proportional yield reduction as compared to the source limitation induced by defoliation. It is also, quite likely, due to the fact that "younger" canopies exhibited by defoliated vines at veraison (median and apical shoot leaves at this time are now mature and more lateral leaves can be present as a compensating reaction to early main leaf removal) may, in turn, lead to higher photosynthesis late in the season.

Thus, preliminary evidence exists that such early leaf removal might represent an interesting tool to achieve both yield control (thereby eliminating the need of costly manual cluster-thinning) and improved quality, which besides the physiological mechanisms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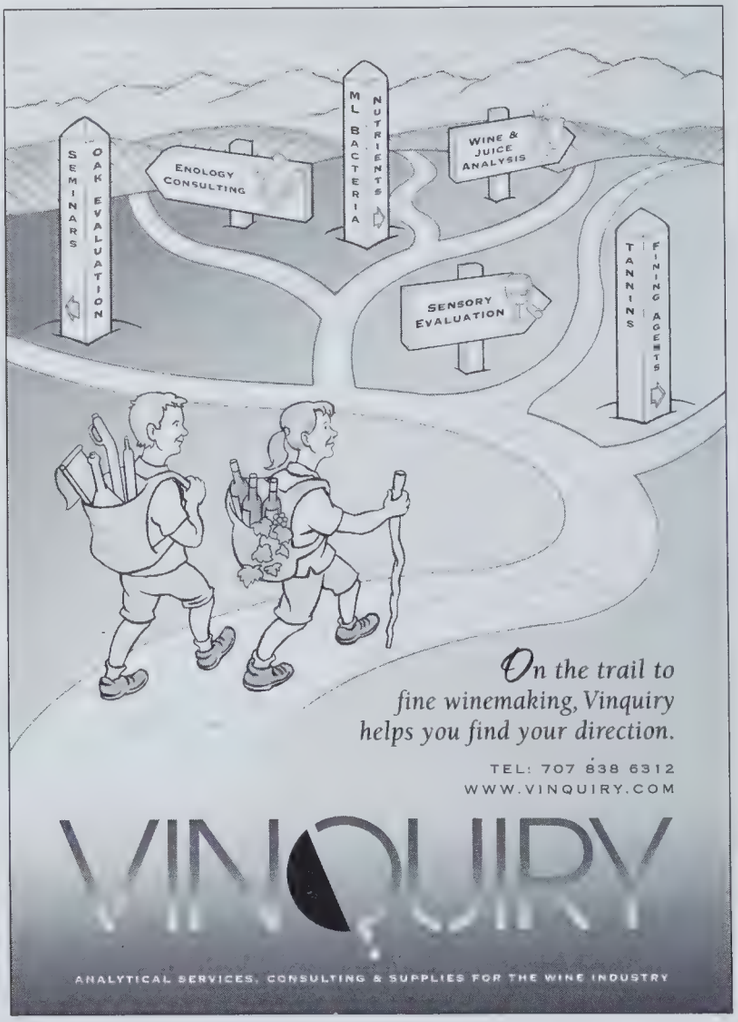


noted above, can also rely upon less susceptibility to bunch rot due to looser clusters.

The mechanical feasibility of early leaf removal is being tested. The major concern is that, especially for pre-bloom leaf removal, the similarity in specific weight of leaves and inflorescence might determine high damage to the latter. A preliminary experience (C. Intrieri, personal communication) performed on COMBI-trained Sangiovese grapevines was encouraging. It suggested that, if the machine is correctly set up and the trellis adequately managed, damage to the inflorescences is minimal and the percent of foliage removed from the basal shoot zone (approximately node 1 to 6) can vary from about 43% for the earliest defoliation (June 1) to 50% for defoliation done after fruit-set (June 15).

The fact that the machine can probably not reach defoliation levels higher than 50% to 60% (on a main leaf basis) might turn out to be a positive feature for the following reasons:

- Based on preliminary physiological results of early manual leaf stripping, a leaf removal percentage of about 40% to 50% may likely be sufficient to get some effect of cluster loosening; and
- Maintenance of some leaves after the machine passage would soften negative effects on bud initiation in the next cropping year and also allow some degree of cluster shading.

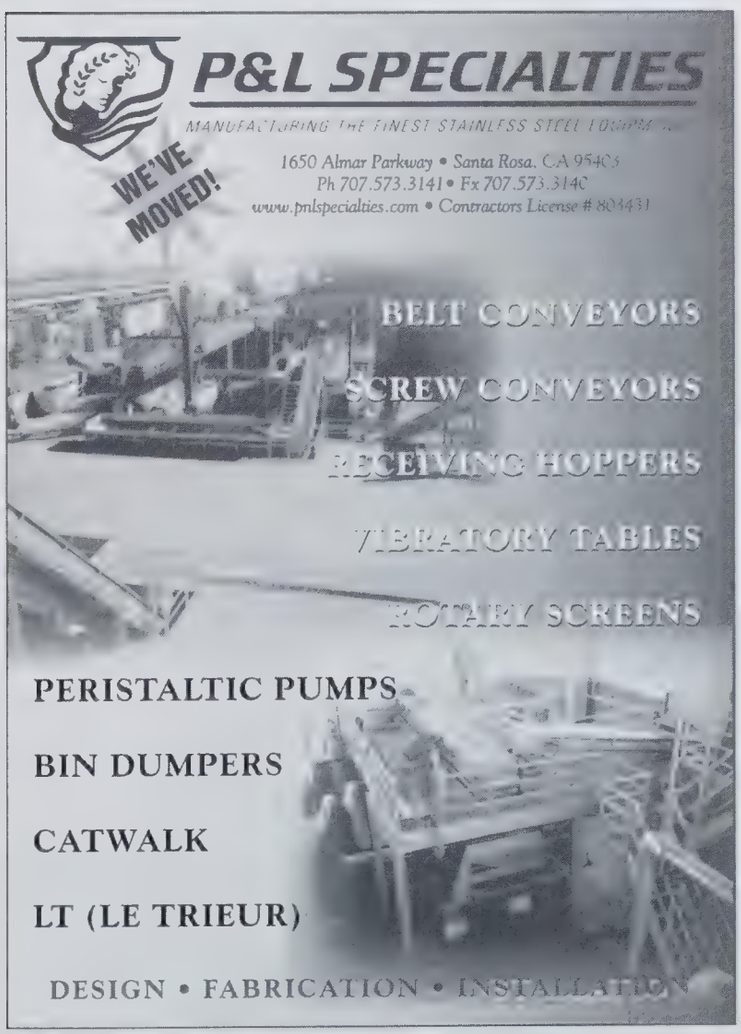
### *Conclusions*

Defining the role that mechanization will have on terroir expression over the next several decades is not an easy task. As a matter of fact, the use of machines is primarily linked to availability of hand labor, an issue which ranges from situations where no labor is available at all (large vineyards in under-populated areas of South Australia) to cases where availability of low-paid workers makes the use of mechanical harvesting (huge properties in the Neuquen area, Argentina) economically unviable.

However, we think that the interaction of vineyard mechanization and terroir will be stronger in the future to achieve grape quality and vine balance.

Mechanical harvesting carried out at night in cooler temperatures can be an important quality factor that is associated with a more effective harvest schedule as a function of cultivar, ripening stages, and/or maturity requirements, compared to a manual work plan. The same applies also to mechanical winter pruning, especially when the technique is used as a "correction factor" for high-vigor sites, where quite often increasing the yield level contributes to balancing the vine.[19]

Even more clear is the role that mechanical summer pruning can contribute. Imagine the perfect ter-



roir site, where vine growth naturally fades and arrests at veraison and no summer pruning is needed. This "ideal" scenario is far from reality, and in many cases, summer pruning is mandatory to correct vine shape, canopy orientation, and excessive growth.

Therefore, in the real world, mechanical practices — such as shoot thinning, trimming and positioning, leaf removal, and so on — must be properly applied as timing and severity are of the utmost importance for achieving grape quality levels.

Furthermore, technological progress is indeed broadening the interaction between mechanization and other vineyard operations. Research is active in assessing the effectiveness of summer pruning (such as leaf removal) combined with spraying,[1] and evaluating grass-mowing machines able to coax the sward under the vines to create an organic mulch.[16] In the not too distant future, the traditional concept of terroir will have to deal more directly with mechanization of vineyard operations. ■

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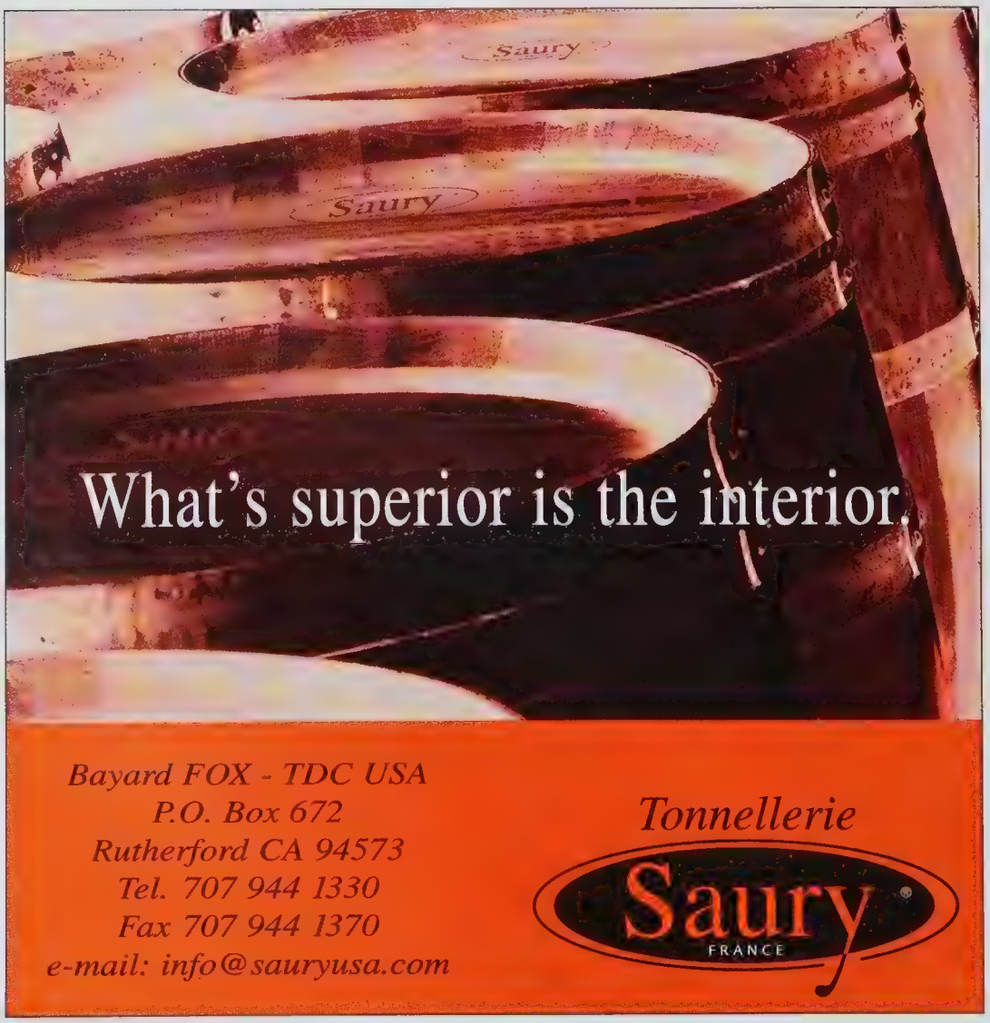

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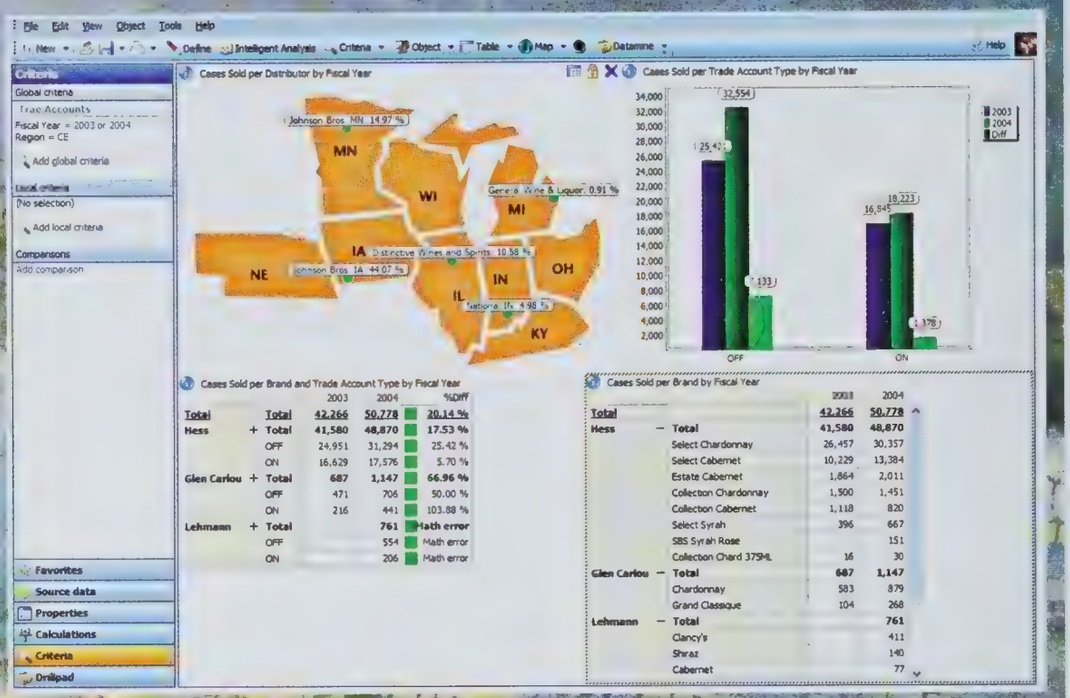



# Software tools for sales/financial management

**BY Tina Vierra**

Though the wine industry used to be techno-phobic, more and more winery personnel are finding that computers are vital tools for successful operations and that the software industry is finally taking winery needs into account.

Three wineries in this case study were early testing sites — Beta-testers — for several software modules for winery sales, retail management, depletions, and financial tracking. Built by Microsoft-partner Elypsis of Napa, CA, the software is now in use at more than 50 wineries under such module names such as eWinery for Microsoft Dynamics-NAV (formerly Navision®), WineClub Manager™, Targit, and Microsoft RMS® (for Retail Management Systems).

**Sales performance of Hess Collection wines (sample computer screen shown above) is tracked in the winery's target markets with Business Analytics software. Data can be turned into maps, charts, graphs and multi-dimensional projections, in order to monitor and improve sales performance.**

## Honig Vineyard & Winery (Rutherford, CA)

At Honig, a small winery producing about 40,000 cases per year, six office personnel work with Elypsis' financial and sales tracking software. In 2001, CFO Tony Benedetti met with Jeremy Grant of Elypsis, on recommendation from another winery. Elypsis, with a background in accounting software for the mid-market, was in the early stages of extending Navision to the wine industry. Benedetti agreed to adopt Navision for Honig's financial management and to help Elypsis fine-tune

the package for maximum usefulness to a winery.

"The beauty of Navision is that it's adaptable for a specific industry," explains Benedetti of his decision to make the change. "The base package is good, and the adaptations Elypsis has done for our industry are even better."

Benedetti became the point person at the winery and installed general ledger, inventory, accounts payable, and accounts receivable packages. He trained the office personnel to use and manage the programs, and the staff as a whole reported to Elypsis to help fine-tune what the software could do, specific to the winery's needs. Elypsis incorporated many of the winery's suggestions as permanent features of the Navision software for wineries.

Two key Elypsis personnel — Grant and Martin Olsen — set up a unique system whereby the software company staff can dial into clients' computers, access Elypsis software, and troubleshoot any problems from wherever they might be. Honig personnel find this service especially responsive to their needs. It was also useful during Beta-testing of Navision, because upgrades to Honig's office systems could be made remotely as they were developed.

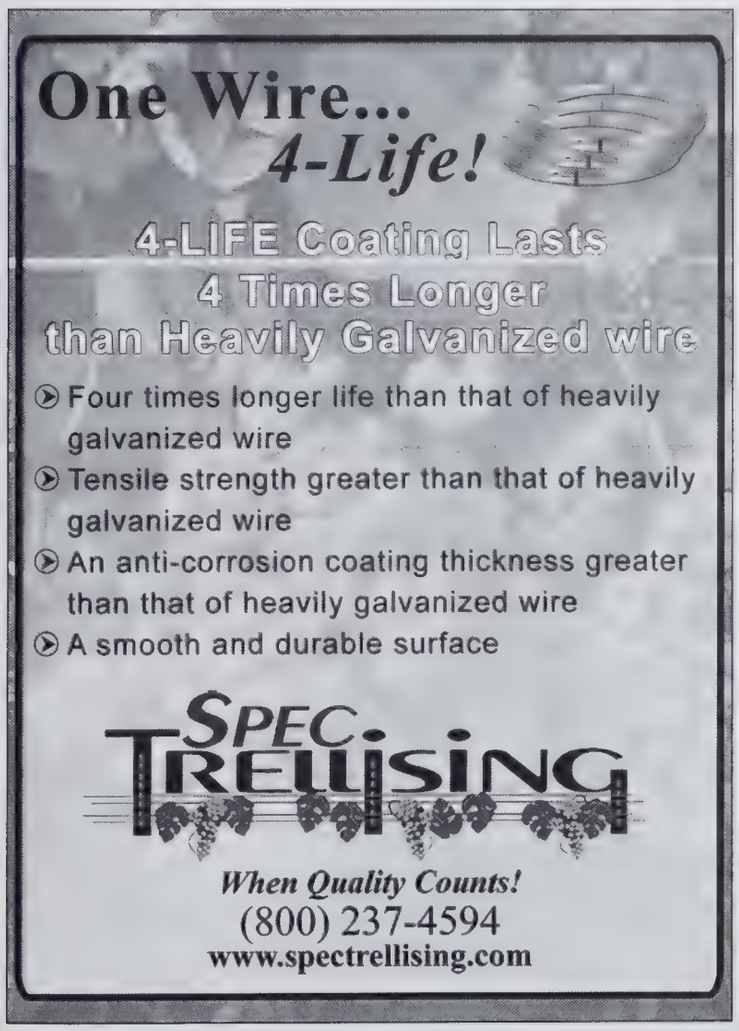
In summer 2003, the Honig tasting room opened to winery visitors. Regina Weinstein, a partner in the winery and its marketing and retail manager, took over retail sales one month after the tasting room opened.

"After looking at several different software programs," reports Weinstein, "I purchased the RMS software because of its ease of use, the Microsoft interface, and the fact that it interacted directly with our accounting program. I installed it and beta-tested it for several months. I also decided to switch over from the Navision-based wine club module to the Elypsis-created Wine Club Manager program.

"We went from a cash box, manual sales, and kitchen table wine tastings to a full tasting room. Of course, we had to automate, and Tony had already found Elypsis to be a good partner with the financial software. The e-Winery solution, which includes the connection between RMS and Navision, was in its early stages back then, and Martin Olsen helped drive the automation process. RMS is an out-of-the-box Microsoft software program. Elypsis writes software that enhances the functionality specifically for the wine industry."

Weinstein reports that it takes just one day to train new tasting room workers to use the retail software. Personnel doing higher-level work in the point-of-sale (POS) and depletions systems take slightly longer to train.

Weinstein is the only Honig employee using the WineClub Manager program. The winery has gone from less than 150 wine club members to 600, since opening its tasting room. Members receive quarterly shipments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of two bottles each, which are shipped by an outside service, New Vine Logistics (Napa, CA). Weinstein exports the mailing data and does a manual upload to New Vine, singling out customers who need special attention or items mailed directly from the winery in each cycle.

WineClub Manager and the RMS software interact, allowing RMS to send new wine club member sign-ups to the other program database and to tag members for a different pricing structure than ordinary tasting room visitors. In the tasting room, a swipe of a customer's driver's license can "grab" the customer's address for swift set-up and sales tracking. Completion of a retail sale removes the wine sold from retail inventory immediately. Sales posting at the end of each business day brings the day's customers into the master database, moves the cash into accounts receivable ledgers, and takes bottles sold out of the winery's master inventory.

Weinstein sees further updates she'd like in both programs. "In the RMS program, I would like to have access to more customer data reports. The standard reports do not provide the data I need, so I need to go to Navision to pull that data. The WineClub Manager is great, but unfortunately, it does not provide a detailed receipt for wine club shipments in RMS. Elypsis is constantly requesting feedback on new features that would make our lives easier."

In October 2005, four Honig sales reps in California were given handheld PDAs and trained to place orders in real-time on the units. "This was a huge timesaver for us, because about one-third of our business is done in California, with reps placing orders all day long. They used to call in the order, which was manually input in the Honig office, then transmitted to the warehouse for shipping."

Under the new system, an order input by the rep on his/her PDA, pops into Navision in the Honig offices, is verified by a staff member, and then pushed to the warehouse's Navision software for fulfillment. Depletions show up on all three screens in real time, so real inventory is at everyone's fingertips. While training of the sales force on the PDA software was not difficult, Weinstein could see that they were nervous at first, concerned about the effectiveness of the software and the accuracy of the real-time data.

"Now, after several months of use, the reps are completely comfortable with it," she reports. "They've got ease of mind because they can watch their orders get confirmed and shipped and have inventory numbers at their fingertips while they're calling on customers."

### Robert Sinskey Vineyards (Napa, CA)

Trish Gordon, accounting manager at Robert Sinskey Vineyards (RSV), was the key user trained by Elypsis when

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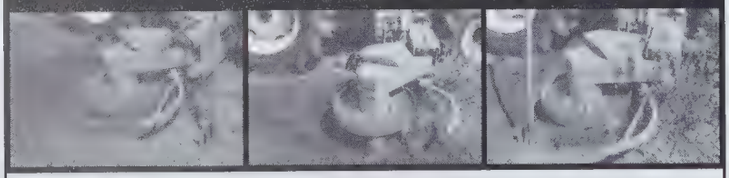

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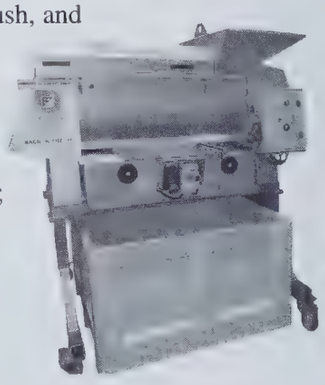

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the winery went live in March 2005 with Navision software. RSV is a small winery producing 25,000 cases/year.

"We started with the general ledger, accounts receivable, sales, purchases, and inventory tracking. Later we used allocations, too. Depletions and the Wine Club modules have also been added," says Gordon. "We're a small winery, so the software was expensive for us, relatively speaking, but it has really been cost-effective." Grant estimates the Return on Investment (ROI) for Navision to be about two years.

Three full-time office staff use the financial software, and Tiffany White, who manages RSV's wine club, uses WineClub Manager. Gordon trained for less than one day after installation and then jumped right in to using the software. An Elypsis troubleshooter was always at hand via the remote access program. For the first four to five months after installation, she was in touch with Elypsis frequently to ask questions and fine-tune the modules for RSV's needs.

Gordon finds it very simple to call up, manipulate, and read data. She uses printing, posting, and invoicing features continuously. She's also working on importing data from her distributors' various software programs into Navision and making the data interactive. Credit management and reminder screens prompt billing and collections.

RSV has a much more demanding wine club than Honig, with 1,400 members who receive monthly two-bottle shipments. Gordon has Navision allocations tied to White's WineClub Manager software to ensure fulfillment. White also sends her customers an opt-out email two weeks before shipping, if a member does not want that month's wines. WineClub Manager generates the email addresses for this activity.

All club members' credit card numbers are on file. White can do a data run of all 1,400 members in less than 90 minutes, which generates all credit card payments paid and declined. Elypsis wrote a script for RSV that sends completed sales data straight into the third-party shipper's template for label printing. It generates a separate report of declined and out-of-date credit card holders, so White can call customers for updates.

As at Honig, the customer lists are integrated between the RMS and WineClub Manager modules, though Sinskey does not offer special pricing for wine club members and so doesn't use those RMS fields.

### Hess Collection Winery (Napa, CA)

Hess Collection is one of the 20 largest wineries in the U.S., with vastly different tracking needs than small wineries like Honig or Sinskey. Hess also has Andy Ridling, IT Manager (translation: Computer Whiz), on staff as the point person to work with Elypsis and Microsoft.

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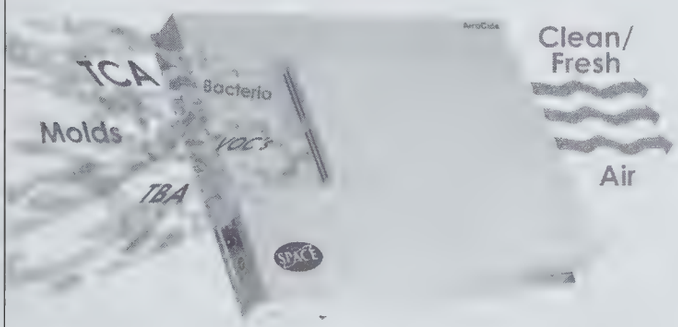


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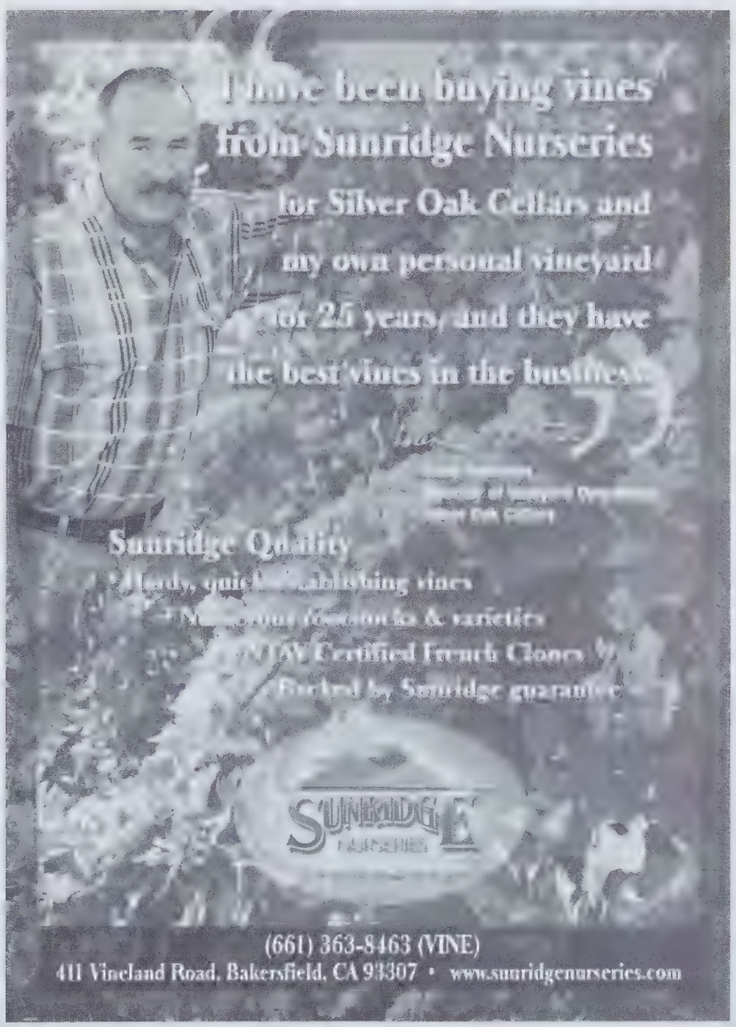
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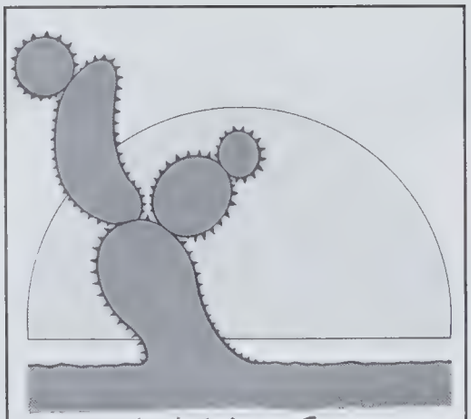
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In late 2002, Hess installed two elements of the Elypsis package: the RMS system and the eWinery for Microsoft Dynamics-NAV financial tracking modules. The software quickly came into heavy use for management of on- and off-premise sales and of numerous brands and varietals. Ridling was instrumental in configuring and implementing an important sub-routine to Navision, called Targit. Targit is a suite of analytical tools to streamline decision-making in wineries, and other large companies also.

Ridling identified several problems that Hess Collection needed its software to solve. The first was multiple databases, which led to redundant entries, administrative mistakes, inaccurate data, and increased overhead costs to manage and fix.

Next were difficulties in managing products and customers. Ridling felt that Hess had a finite product, for an unknown number of customers, in ever-changing conditions.

Third, Hess staff had inefficient access to data they needed. Internally at the winery, staff couldn't get hold of data being generated by a sales force on the move. Externally, the sales force couldn't access data about inventory and operations inside the winery. Employees were expending excessive time and resources to generate reports for each other, and delays in order and payment fulfillment resulted. Ridling estimated that 10% of winery personnel in vital areas were doing 90% of the reporting work, while the other 90% of staff needed the reports but had to wait.

The number and flexibility (or lack thereof) of reports that staff could generate were also a problem — the problems led to confusion, reliability issues, wasted resources, out-of-date reports, and time lost.

With eWinery for Microsoft Dynamics-NAV as the foundation, Ridling modified standard Targit views to resolve these problems at Hess. They developed views optimized for the wine industry.

What Ridling created were "cubes" of information — multi-dimensional ways to crunch data for analysis. The cubes, made by and for the multi-brand, multi-user winery, give greater depth of usefulness to the winery's data, greater filtering, quick interaction, and information analysis and forecasting (and not just reporting) to help winery managers make better decisions.

"For instance," offers Grant, "Hess Collection's team can go into a meeting about the Chicago sales market. In the past, reports for one brand might have taken a staffer over a week to compile for such a meeting, using Access and other common databases. If the team wanted to see reports on another Hess brand for the same market, there was another week's work for someone. Now these reports can be produced on demand, even as the meeting progresses. But this software goes way beyond just *reporting*."

Hess personnel can look at a wine's performance in a given market in three dimensions — past, present, and future performance. By gauging what business they have done in Chicago and looking at how business is currently going in Chicago, they can enter sales strategies into the system and predict how the wine might perform in the future in Chicago. Change the strategy, get a different prediction. As a result, Hess can actively plan market strategies to achieve sales goals.

Fortune 500 executives refer to this kind of process by a variety of names, such as Key Performance Indicators, Executive Dashboards, and Business Intelligence. But the key for Hess — which led to development of a product that could be brought to market for other types of companies beyond wineries — was tighter data management, better reporting, and the depth of analysis winery managers needed to handle multiple brands and varietals in multiple markets.

### *Future for software application*

eWinery for Microsoft Dynamics-NAV also offers other features important to wineries. The software was often customized with RFID (radio frequency identification) tagging capabilities in earlier versions, because large retailers, such as Wal-Mart, require all of their vendors to provide such tagging to save the retailer time when checking inventory in and out of ware-

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houses and stores or tracking its location. According to *Business World* and other magazines watching the market, other retailers will soon follow suit. By late 2006, the latest version of eWinery for Microsoft Dynamics-NAV will have RFID capability out-of-the-box, says Grant.

In 2006, wineries must also comply with new FDA Bioterrorism Act guidelines that require full-lot serial number tracking. This capability is built into the newest version of the software (available late 2006).

Jeremy Grant believes that effective financial software can be an important factor to help wineries survive tough competition. "Because the wine industry has evolved over the years from small, family-run businesses, the focus on developing business software solutions has been slow in coming," says Grant. "It is not enough to make good wine; everyone is doing that. The real challenge is running an efficient and profitable operation that includes winemaking, selling it, and building a loyal following. This is where software can help." ■

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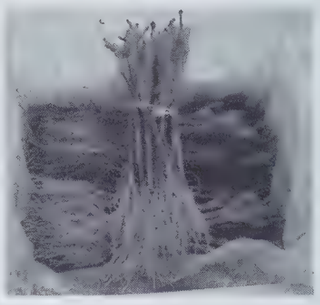

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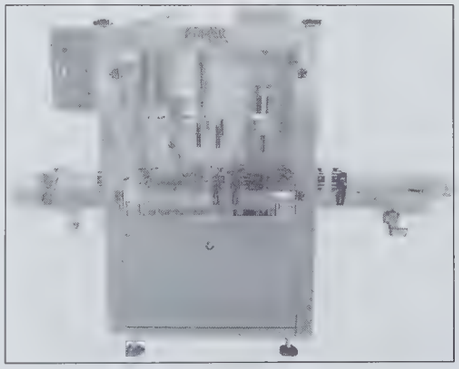

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PART II

# Do corks breathe?

## Origin of post-bottling sulfides

BY Alan Limmer

Another dramatic illustration of the effects of very small amounts of oxygen, and their influence on sulfur-like odors (SLO) was demonstrated in the Australian Wine Research Institute's (AWRI) experiment showing relative amounts of sulfide character under three closures: glass ampoule, screw cap, and cork.[1]

The ampoule is completely anoxic and demonstrates high sulfide levels, with the screw cap near anoxic and intermediate levels, and the cork sample showing almost nil, but higher oxidative levels. This also suggests the scalping theory is not the explanation for variation in SLO occurrence between screw cap and cork. The screw cap wine should have had the same amount of SLO as the ampoule.

By this chemistry, the nearer one approaches a state of anoxia, the more one can expect to encounter SLO. The redox chemistry of sulfides predicts this, and the excellent AWRI sensory work demonstrates the effect. Early development of screw cap barriers also encountered this problem.[4] When a tight sealing aluminium barrier was used, the wine went reductive, but other barriers did not have the same effect. The redox potential under the aluminum barrier dropped sharply, about twice as far compared to the others.

Changing the barrier under the screw cap will alter these results. The AWRI trial results relate to the low ingress metal foil-type barrier.

This reduction effect is not, or should not be new to winemakers. How many times have you cleaned a wine up with copper(II) fining or filtration in preparation for bottling, only to see it lose some of the vibrant varietal notes while stored under gas in tank? A further copper fining restores the original vibrant notes. This is a clear case of reducing redox potential producing more deleterious sulfide notes from an otherwise "clean" wine. There is no difference between this scenario and that experienced under screw cap — except you can't get at the wine again.

### Clean wine status

This explanation has significant implications for the use of screw caps. First, it is incorrect to blame poor winemaking for all instances of SLO. Many, if not most, of the wines may well have been (probably were) clean at the point of bottling. But a definition of clean depends on the redox state of the sulfides.[9] Scrupulous cleaning up of the copper-treatable sulfides is no guarantee against SLO. It requires the ascorbic acid/copper(II)/carbon treatment to remove disulfides (and then with limited efficacy).

Second, the commonly attributed benevolence of cork to these characters is actually a manifestation of the altered state of redox potential. This will be impossible to reliably replicate under screw cap without resorting to a range of permeabilities for these closures.

Third, the history and sulfide composition of a wine, plus a host of other antioxidant factors will vary from wine to wine, year to year. To predict which $SO_2$ level for a particular wine is likely to mitigate the effects of SLO is likely to lead to erratic and often, unfortunate results.

The alternative is to simply raise the degree of oxygen ingress. This will maintain the disulfides in their current form, and, in fact, oxidize any thiols into disulfides. (But the post-ferment thiols [and $H_2S$] really should have been cleaned up beforehand).

It may well be time to look at a range of oxygen transmission rates (OTR)s for wine closures. Certainly they are going to be near the low (anoxic) end of the scale, but generally, likely to be above the current range of low-ingress screw caps.

The notion that every producer, and wine should subscribe to one minimal OTR-closure is like saying all wines have a particular style.[5] Once there is enough OTR to cross the anoxic/sulfidic threshold, how much more ingress will be a stylistic choice. In the same way a winemaker chooses how much barrel ageing etc, and whether a wine is bottled more advanced or reserved as a style.

There are limitations at the moment, in choice, but closure manufacturers should be aiming to provide winemakers with a range of useful options, given this factor has such an influence on the post-bottling outcome. The lower the OTR of a closure, the more precise the wine parameters have to be met, regarding the competing oxidation/reduction to achieve a successful outcome. From that viewpoint, one could conclude it may be better to build in some latitude to mimic the cork's approach.

### Available options

Figure II (page 23, March/April 2006, courtesy of Oeneo Closures Australasia — formerly Sabate) shows a low OTR range for two closures — the P10 and P1. Oeneo Closures have the P1 and P10 in the market as Diamond (liquid $CO_2$ washed) and Reference (steam wash). The P1 has an OTR quoted as four times that of screw cap while the P10 is ten times that of the P1. There was under trial a lower grade of OTR — P0, which was equivalent to foil screw caps. But this is not going to market. It did not score as well as P1 in sensory evaluation. The P0 formulation and OTR is the same as the one used for Altec corks in the original AWRI closure trial.

In the original AWRI closure trial, Altec corks scored as badly as screw

cap for SLO.[1] This is further good evidence that scalping is not the issue regarding corks having less SLO than screw cap. The thing the Altec and screw cap have in common is their OTR (pers comm. — OeneoClosures). In fact, the OTR of the Altec appears to be slightly higher than the metal foil screw cap, but not enough to prevent SLO in the case of the trial wine.

The above information can help answer almost as many questions about wine closures and bottle development.

**Do wines need oxygen to age?**

No. Wine has no "need" for oxygen. The only part of the process which has a definitive requirement for oxygen is the increase in biomass of the yeast during ferment. Other than that, wine can be made completely anaerobically. But in practical terms, this is an impossibility and we have come to appreciate wine styles which have encountered some oxygen contact.

Also winemakers have come to learn and appreciate that certain amounts of oxygen, at certain points in the process, lead to beneficial outcomes — such as barrel ageing, micro-ox, etc. These are stylistic preferences to completely anaerobic winemaking. The same can be said for closures. The primary purpose of a closure is to reduce access to oxygen after the winemaking process has finished. In that respect, the screw cap is as near perfect as available. Almost there, but not quite.

The glass ampoule is the point where practice and theory coincide. Except, it demonstrates the highest level of SLO. Remember, the closer we move to complete anoxia, the more SLO will be encountered. The ampoule experiment is a good illustration of this.

**Do red wines need oxygen to develop in the bottle?**

Yes. If one wants a wine to evolve as per previous experience under cork. (This goes for white wine too).

To try and make one extremely low OTR that suits all wines is going to lead to variability of results not between individual bottles, but wine to wine, vintage to vintage. Winemakers, who have success under a screw cap one year, cannot necessarily expect the same result next vintage for the same wine.

If wines could be made guaranteed free of complex sulfides, and the bottle development was not expected, or required to follow the same pathway as the cork experience, then a totally anoxic closure may be the best solution. But this pathway puts severe demands upon the winemaking process. This is evidenced by the repeated occurrence of these SLOs, even when the winemakers seem mystified by their occurrence, having rigorously copper-fined the wine.

To require wines to be completely free of any sulfide precursors will place demands, which at this point in time,

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winemakers are unable to (and may not wish to) consistently achieve. The recently released report by the Australian Closure Fund also ran into the reductivity problem.[2] It is a wine specific condition, not a generic one.

The above information explains that the ageing process, post-bottling, is, in fact, one of oxidation rather than the commonly-held belief of asphyxia. It can be thought of in terms of a micro, micro-oxidation, at very low redox potential. But an oxidation, it is. Any oxygen ingress = oxidation, irrespective of $SO_2$ levels.[3] In other words, a prime effect of the oxygen ingress is to mitigate the chemical effects of particular sulfide reactions, accompanied by a commensurate oxidative ageing of the wine.

### *Don't be shocked*

This may come as a shock to winemakers who have held to the belief of the reduction mechanism for bottle age, and possibly a relief to those who have seen their $SO_2$ levels steadily diminish over time, until finally, the wine crashes. With this viewpoint, controlling the oxygen ingress becomes a matter of significance, rather than aiming for total exclusion. In one of life's serendipitous coincidences, the humble cork has done a pretty good job, especially considering the age of the technology.

### Do different wine types need different OTRs?

The simple answer is no. In general, cork traditionally (taint excepted) has done a pretty good job of ageing wine, then the median OTR and some range around that seems quite tolerable, for all wine styles. Winemakers generally have not chosen particular grades of cork for particular wines based on OTR. They are just as likely to use high-grade corks for all high-grade wines — be they delicate aromatics, or full-bodied reds. With equal success.

From this, it can concluded that each style is capable of faring equally well within a reasonable range of OTR, providing the extremes are avoided. At the low OTR end, there may be some wines suffering from being tight, closed, faintly dirty (SLO), while at the other end, the wine will age faster than the norm. This would suggest that, as long as a wine is above the anoxic threshold, then the wine has no particular preference.

Certainly, by increasing the OTR to the upper acceptable end, a wine is going to develop faster and have a shorter shelf life. This may be useful in some circumstances. But, in practice, once there is enough OTR to cross the anoxic threshold (some safety margin may be useful), there is no need for more — other than stylistic preferences.

**Continued on page 88**

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# Let's talk CORK

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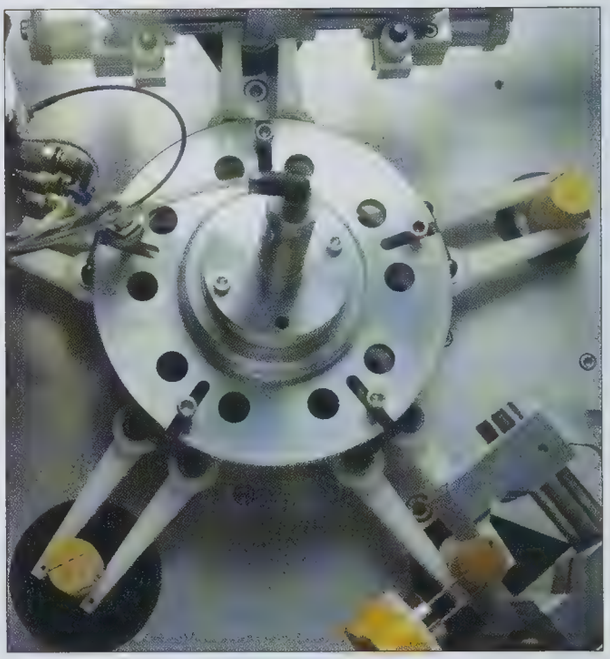

The love affair between wine consumers and cork began back in 1670, when French monk Dom Perignon first used it for the sparkling wine of his Hautvillers' monastery. Since the 1700s natural cork has been the leading closure for fine wines from every part of the world. Nine out of ten U.S. consumers feel that non-cork closures cheapen wine, a 2006 survey of the wine trade here found. In survey after survey, wine lovers show cork is still the preferred closure for fine wines by a wide margin.

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# Winemaking Supplies

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### Parker Hannifin Corporation

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242 Neck Rd., Haverhill, MA 01835
tel: 800/343-4048, 978/858-0505
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*PLEASE SEE PARKER HANNIFIN CORP. AD, PAGE 2.*

## StaVin, Incorporated

StaVin's Oak Integration Systems provide *Traditional Flavor and Real Economics*. StaVin's oak is naturally seasoned for three years and available in three toast levels. To ensure thorough heat penetration and complex flavors, all oak is traditionally fire-toasted.

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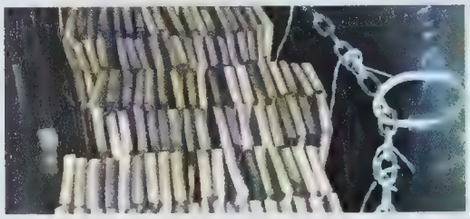

StaVin's website www.micro-ox.com, discusses how StaVin's oak and a micro-oxygenation system replicate the benefits of winemaking in barrels – within tanks. Read how StaVin's oak effectively cross-links grape tannins to build mid-palate structure and stabilizes color in red wine fermentation.

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Impart neutral barrels with the complexity and quality of new oak barrels with StaVin's Oak Barrel Replica, Traditional Barrel Insert (now available in a new barrel extraction level), or Infusion Tube.

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**Alan Sullivan, Steve Sullivan, Dr. Jeff McCord, Dr. Jeff Murrell, Jennifer Metz, Jamie Zank**
PO Box 1693, Sausalito, CA 94966
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*PLEASE SEE STAVIN INC. AD, PAGE 16.*

## Gusmer Enterprises

Chr. Hansen's new "mixed cultured" yeast blends combine Saccharomyces and selected non-Saccharomyces strains of yeast to mimic the desirable results of a "wild" fermentation under the secure conditions of an inoculated source. The concept and products have become a big success in major wine producing regions throughout the world.

"The non-Saccharomyces mixed cultured yeast strain showed very well in our Syrah yeast trials. For the second consecutive year, this yeast blend added complexity and structure over other yeast strains in the trial, and the differences became even more pronounced as the wines aged," says one California winemaker in 2006.

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Gusmer Enterprises offers the full range of Chr. Hansen bacteria, yeast, nutrients, and lysozyme, in addition to filter media, fining agents, enzymes, oak alternatives, and more.

Gusmer Enterprises, Inc.

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tel: 707/224-7903; fax: 707/255-2019
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tel: 559/485-2692; fax: 559/485-4254
**East Coast:**
1165 Globe Ave., Mountainside, NJ 07092
tel: 908/301-1811; fax: 908/301-1812
e-mail: sales@gusmerenterprises.com
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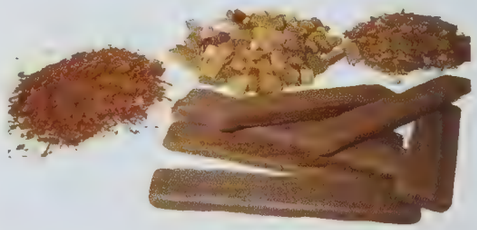
*PLEASE SEE GUSMER ENTERPRISES AD, PAGE 52.*

## Pickering Winery Supply

Pickering Winery Supply (PWS) distributes oak adjuncts from Suber-Lefort of Adelaide, Australia, which has 16 years experience in turning French barrel-quality oak into tank planks, mini-staves, chips, flakes, and powder. It is the seasoning and toasting regimens of the oak that result in flavor profiles quite distinct from any others. In addition, Suber-Lefort works with many wineries to develop specialized flavor profiles to match the style of wine they wish to produce. Yellowtail, the most popular Austalian brand in America, buys almost exclusively from Suber-Lefort.



PWS distributes a special fining agent produced in Germany, Vinpur Special, based on casein. It offers a gentle way to remove astringency, brown pigments, and oxidized phenols in red and white wines. What makes it unique is that it uses cellulose as a carrier, giving the casein a larger surface area and making it disperse much more completely. The result is a powder that can be directly added to the wine and is very predictable, unlike regular casein. Many wineries now consider Vinpur Special an integral part of their winemaking.

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**Pickering Winery Supply**
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tel: 415/474-1588; fax: 415/474-1617
e-mail: info@winerystuff.com
website: www.winerystuff.com

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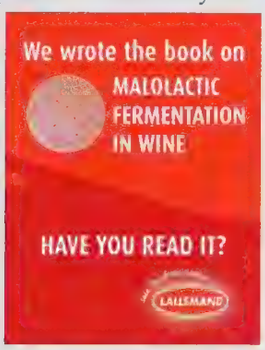
## Lallemand

For over 25 years, Lallemand's commitment to research and development in the area of winemaking fermentation continues to be Lallemand's primary goal. A new publication from Lallemand, *Malolactic Fermentation In Wine — Understanding The Science and the Practice*, is now available to help winemakers and guide them in their quest to manage and control malolactic fermentation.

"Lallemand has brought together a compendium of solid, practical information and guidelines that can be of immense value for practical implementation of MLF. Lallemand research and laboratory capabilities have been instrumental in defining and understanding the scientific aspects of MLF, and Lallemand personnel worldwide have conducted practical, production-scale MLF experiments to verify the science.




"Comments like, 'It doesn't go when I want it to,' and 'I don't like what it does to the wine' are no longer valid. MLF has been domesticated by scientific knowledge coupled with practical experience. The knowledge and recommendations contained in this publication should be used to augment the talent and dedication of winemaking professionals worldwide. As always, the ultimate goal is to produce a product of uncompromised quality and distinction." Excerpt from the introduction by Dr. Rich Morenzoni, scientific editor.

*For more information, contact:*
**Lallemand**
**Gordon Specht**
PO Box 5512, Petaluma, CA 94955
tel: 707/526-9809; fax: 707/526-9803
e-mail: gspecht@lallemand.com
website: www.lallemandwine.us

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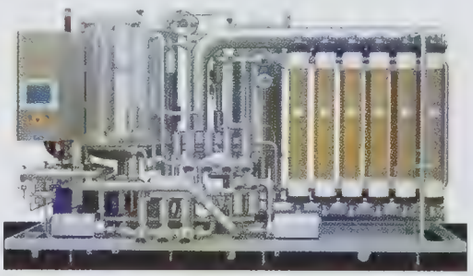
## Pall Corporation

The OenoFlow XL system is the newest generation of Pall's OenoFlow systems which have rapidly become a worldwide benchmark in reducing the need for filter aids, including diatomaceous earth (DE), in the winemaking process without affecting quality of the final product. As a modern and advanced alternative to DE filtration, the giant hollow fiber module of the OenoFlow XL crossflow filtration system will help large wineries set a new standard in achieving brand quality, yield, and integrity goals.



The unique, symmetric structure of the hollow fiber microfiltration membrane offers all the advantages and benefits that Pall OenoFlow systems provide to mid-size and boutique wineries. These include a high filtrate output, and no pretreatment of the wine. No filters thereby eliminate DE disposal and handling, easy and safe operation and consistent filtrate quality with maximum protection of the sensorial characteristics of the wine. Even with large surface-area modules, the OenoFlow XL system is a compact design requiring a minimal footprint for installation. New software and a touch screen make the system even more user-friendly and simple to operate.

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**Pall Corp. North America**
**Nicole Madrid**, General Sales Manager, Wine & Spirits
25 Harbor Park Dr.
Port Washington, NY 11050
tel: 516/801-9137, toll free: 866/905-7255;
fax: 516/625-3610
e-mail: foodandbeverage@pall.com

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## Oak Solutions Group

Oak Solutions Group distributes the ēvOAK oak alternative product line. ēvOAK's philosophy of "Flavor by Design" is characterized by high-extract tank stave products: High Vanilla, High Spice, High Toast, and High Mocha staves. The concentrated, singular flavor profiles suit a specific need and are ideal for blending. With a quick extraction rate, high extract oak products are ideal for finishing wines.

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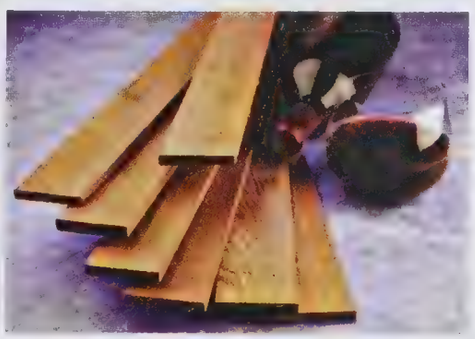

The portfolio also includes classic American and French oak chips and powders, and high-quality, profile-toasted tank staves and barrel inserts. Other forward-thinking ēvOAK features include stay-fresh bags that preserve freshness and seal air out. There are 40 high-extract staves of choice in easy, grip-handled infusion bags, then placed in vacuum-sealed bags for fresh aromas and flavors, and extended shelf-life.

Oak Solutions Group specialists provide expert advice in aging wine with a wide range of super-premium oak products.

*For more information, contact:*
**Oak Solutions Group**
**Paul Abbott**, Oak Solutions Specialist
2557 Napa Valley Corp. Dr., Ste. D
Napa, CA 94558
tel: 707/259-4988; fax: 707/255-5952
e-mail: pabbott@oaksolutionsgroup.com
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## ATAGO USA, INC.

ATAGO is celebrating over 65 years of designing and manufacturing reliable, accurate, and dependable refractometers for the winemaker, vineyard owner, and grape grower. ATAGO products are ISO 9001 certified, and used in over 135 countries worldwide.

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e-mail: customerservice@atago-usa.com
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*PLEASE SEE ATAGO USA AD, PAGE 62.*

## NAPA FERMENTATION SUPPLIES

Napa Fermentations offers Lalvin fermentation supplies including 23 strains of wine yeast and enzyme products. Malolactic bacteria include: Chr. Hansen Viniflora Oenos, Chr. Hansen CH 16, and Chr. Hansen CH35. Yeast nutrients include Fermaid K and Super Food.

Napa Fermentations provides winemaking equipment and supplies, including labware, refractometers, wine thieves, rubber stoppers, oak products, wine hose, tubing, fermentation locks, and chemicals.

Napa Fermentations introduces the accurate, reliable, and easy-to-clean French Demoisy Galeo Destemmer. The destemmer's stem cage with stamped holes protects grapes, rotates slowly, and has a revolving shaft fitted with rubber fingers and includes two separate motors; one for the shaft and one for the cage. The destemmer can be dismantled in one minute by one person, and includes a built-in washing pipe. There is optional variable speed for the feed screw and cage.

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PO Box 5839, Napa, CA 94581
tel: 707/255-6372; fax: 707/255-6462
e-mail: wineyes@aol.com
website: www.napafermentation.com

*PLEASE SEE NAPA FERMENTATION AD, PAGE 66.*

## VINQUIRY

Vinquiry offers a large selection of fermentation and specialty winemaking products. The following are the newest products for the 2006 harvest.

**Yeast strains:** Enoferm VQ15 was isolated by Vinquiry and selected in collaboration with winemaker Jeff Cohn from spontaneous Rockpile Syrah fermentations. This new California isolate is intended for use in concentrated reds, particularly Syrah, Zinfandel, Cabernet Sauvignon, and Merlot. Vitilevure M83 is a new strain specially adapted for fruit-forward red and rosé wines with potential high alcohol.

**Nutrients:** Enoferm Protect is the latest innovation in yeast nutrient technology to be used during the rehydration phase. It includes naturally-occurring sterols and micro-nutrients to protect yeast in difficult fermentation conditions, such as potential high alcohol and stuck or sluggish fermentations. White Style is a natural, inactive yeast strain, rich in polysaccharides and antioxidant peptides combined with enzymatic activity. It is intended for use after primary fermentation for aroma enhancement and broadened mouthfeel in white wine. Red Style is a combination of pectinase-macerating enzyme and specific inactive yeasts for improving red wine mouthfeel and color.

**Tannins:** Vitanil Oak is purified oak tannin that protects against oxidation and preserves color in red and white wines. It contributes to structural balance and harmony.

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**Vinquiry**
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e-mail: info@vinquiry.com
website: www.vinquiry.com

*PLEASE SEE VINQUIRY AD, PAGE 58.*

## WineTech

Winetech was founded in 1998 by an Italian family of winemakers. Over the last seven years, Winetech has established a reputation for delivering the highest quality of winemaking products, equipment, and services to all California winegrowing regions.

Winetech is proud to offer a complete line of equipment and products from manufacturers committed to enological research and development. In addition, Winetech's winemakers work with customers to achieve the highest wine quality by blending its technology and expertise with the vision and goals of the customer.

**Enology products** include yeast, nutrients, enzymes, tannins, fining agents, filtering media, and additives.

**Equipment** offerings include all types of processing and filtration equipment.

**Mobile services** encompass lees filtration, VA adjustment, crossflow filtration, diatomaceous pressure-leaf filtration, removal of 4EP, 4EG, TBA, or TCA.

Winetech provides information and the resources necessary to help you choose the best winemaking technologies, supplies, and equipment. Samples and literature on winemaking products are readily available. Winetech also conducts equipment demonstrations, product trials, and seminars.

*For more information, contact:*
**Winetech**
2511 Napa Valley Corporate Dr., Ste. 112
Napa, CA 94549
tel: 707/552-2080; fax: 707/552-2117
website: www.winetech.us

*PLEASE SEE WINETECH AD, PAGE 26.*

## Scott Laboratories, Inc.

BoosterBlanc is a new Lallemand natural yeast derivative nutrient from an ICV yeast strain for white and rosé wine production. ICV sensory trials revealed that BoosterBlanc increases mouthfeel, volume, structure, and fruit aromas while decreasing bitterness, chemical, vegetal, and burning perceptions. BoosterBlanc can be added toward the end of fermentation to reveal muted aromatics.

Fortiferm is the result of a joint Institut National de Recherche (INRA)/Lallemand study of difficult fermentation conditions (overripe or marginal fruit, high bacteria populations, and ethanol toxicity). It was determined that often yeast were left vulnerable due to insufficient sterols and polyunsaturated fatty acids. Fortiferm is designed to correct for such factors. Using the patent-pending preparation process called Natstep™ (**NAT**ural **STE**rol **P**rotection), this new nutrient combines yeast protection (provided by sterols and fatty acids) with nutrients to enhance/optimize fermentations.

Laffort Oenologie introduces a new macerating enzyme for red wine: Lafase Fruit derived from *Aspergillus niger* for production of fruit-forward reds and rosés. It gently extracts anthocyanins and aroma precursors to produce wines with fresh fruit, good color, and body. Lafase Fruit allows for short maceration with or without soaking.

Actiflore Rosé is a new Laffort Oenologie yeast for production of rosé wine. It is a quick fermenting strain noted for fruity, floral fermentative aromas, good alcohol tolerance, and low temperature tolerance. Actiflore Rosé releases less volatile thiols and more fermentation esters (particularly isoamyl acetate) than most strains, making it a good choice for blending.

*For more information, please contact:*
**Scott Laboratories, Inc.**
PO Box 4559, Petaluma, CA 94955
tel: 707/765-6666; fax: 707/765-6674
e-mail: info@scottlab.com
website: www.scottlab.com

*PLEASE SEE SCOTT LABORATORIES AD, PAGE 67.*

## Hanna Instruments

Hanna Instruments offers the **HI 222** professional pH kit for winemaking. This kit features Hanna's laboratory bench meter, an electrode for wine measurement featuring Hanna's exclusive CPS™ (Clogging Prevention System) and a set of specially designed cleaning solutions for optimum pH measurement performance.

The **HI 222** bench meter features Hanna's advanced Calibration Check™ technology, which allows you to monitor the status of the basic elements of the calibration system: the pH electrode and the buffer solution. This logging bench meter performs a complete diagnostic check during each calibration. Digital gauges reflect any significant changes in one or both of the electrode's offset and slope values. Error messages alert the user to specific situations such as a cracked electrode, clogged junction, and even contaminated calibration solution.

A pH electrode becomes dirty very rapidly when measuring the pH of must and can give results that are up to ± 0.5 pH inaccurate. Hanna's advanced wine electrode guarantees accurate measurements with its exclusive Clogging Prevention System™.

Cleaning a pH electrode with cleaning solutions specific to the type of sample used during measurements has often been underestimated. Hanna's new wine stain and deposit-cleaning solutions guarantee accurate measurements and a longer-lasting pH electrode.

*For more information, contact:*
**Hanna Instruments**
584 Park East Dr.,
Woonsocket, RI 02895
tel: 401/765-7500; fax: 401/762-5064
e-mail: wine-brew@hannainst.com
website: www.hannainst.com

*PLEASE SEE HANNA INSTRUMENTS AD, PAGE 53.*

## Maurivin Yeast

Maurivin Yeast is releasing a new, innovative range of fermentation aids and the development of a new AWRI hybrid strain ideal for red winemaking.

Mauriferm Gold is a special formula of inactive yeast cell walls, diammonium phosphate, vitamins, and trace elements. The addition of inactive yeast cell walls is a proven mechanism for reducing the chance of problematic fermentations, by absorbing toxic medium-length chain saturated fatty acids. Furthermore, the addition of nitrogen and other yeast nutrients makes Mauriferm Gold ideal for improving fermentation rate or for restarting stuck or sluggish ferments. Mauriferm Gold is one of a new range of fermentation aids now available from Maurivin.

maurivin™

AWRI 1503 is a new, innovative hybrid strain developed by the Australian Wine Research Institute (AWRI). AWRI 1503 was developed by mating efficient, reliable Maurivin PDM with a strain of *Saccharomyces kudriavzevii* known to enhance palate weight and complexity. Commercial red-winemaking trials have shown this hybrid strain to increase palate length and fruit concentration while retaining the strong fermentation properties of PDM.

Along with these new innovative products Maurivin continues to deliver premium, high-performance wine yeasts, including the popular Elegance, AWRI 796, and PDM. For more information regarding Maurivin Yeast, please contact Pacific Coast Chemicals or visit the comprehensive website: www.maurivinyeast.com.

*For more information, contact:*
**Pacific Coast Chemicals**
2424 Fourth St., Berkeley, CA 94710
tel: 510/549-3535; fax: 510/549-0890
website: www.pcchem.com
e-mail: steveshaffer@pcchem.com

*PLEASE SEE MAURIVIN YEAST AD, PAGE 48.*

## Nadalié, USA

FIRE! FIRE! FIRE! is the motto for Nadalié barrels and Oak Add Ins. Although the products differ, the concept of toasting and wood sourcing remains the same.

NADALIE
USA

Barrels supplied by Nadalié continue to have traditional open-fire toasting. In America, Nadalié started the fire-toasting process in 1980. Barrels manufactured in Calistoga and Bordeaux are toasted the old, traditional French way. To focus on the fruity and spicy character of French oak, the Bordeaux cooperage has developed the Perle Blanche toasting process of barrels primarily for white wines.

All the Oak Add Ins are also toasted over open-oak fires. Thereby, wines processed with Oak Add Ins are unique in the industry. Manufacturing of Oak Add Ins has been refined to focus on two major toasts — medium, and medium-plus. More toasting levels are also available for chips, cubes, and blocks. Nadalié manufactures a complete line of Oak Add Ins which respects traditional winemaking techniques.

*For more information, contact:*
**Nadalié, USA**
**Duane Wall, Alain Poisson, Thierry Roussille, Aurelia Rivier, Raynah Obaza, Chris Hansen, Jonathan Daniels, Tom Cottrell**
1401 Tubbs Ln., Calistoga, CA 94515
tel: 707/942-9301; fax 707/942-5037
e-mail: nadalie@napanet.net

*PLEASE SEE NADALIÉ USA AD, PAGE 25.*

## Vintners Supply Company

Vintners Supply Company (VSC) is proud to be the exclusive western regional North American distributor for EUROPOR® depth media manufactured by E. Begerow GmbH of Germany. VSC also offers the Becodisc stack disk modules, Beco Compact Plate filter, Beco Integra Cart stack disk filter housings, and Beco-Integra Cart cartridge filter housings.

BEGEROW

VSC offers the complete line of SIHA yeast and enzymes, and Begerow wine and beer additives.

SIHA

VSC represents C.E. Bartlett of Ballarat, Australia. Bartlett manufactures quality replacement membranes for most makes and models of grape presses.

A complete line of pre-coat and filter press filters is available from Dorr-Oliver Eimco. VSC offers replacement filter plates from Envirotech and replacement filter cloths for pre-coat filters and filter presses from Crosible Filtration, Inc.

VSC offers VSC proprietary cartridge filters. These filters are available in absolute, integrity-testable formats and nominal pore sizes from 0.1 micron to 70 micron. Cartridge filter housings by VSC are available from single cartridge to multiple round housings in sanitary stainless steel configuration.

Customers are invited to visit the showroom and warehouse at 3715 Santa Rosa Ave, # A-5, Santa Rosa, CA.

*For more information, contact:*
**Vintners Supply Company**
**Robert H. Moeckly**
PO Box 153, St. Helena, CA 94574
tel: 800/366-6809; fax: 707/584-7955

*PLEASE SEE VINTNERS SUPPLY CO. AD, PAGE 51.*

## International Specialty Products (ISP)

ISP's Polyclar® wine stabilizers are based on proven Polyvinylpolypyrrolidone (PVPP) technology. This provides effective and highly selective reduction of polyphenols causing oxidative discoloration, haze, or loss of fresh aroma and flavor characteristics:
1. Prevention of "pinking" and "browning" reactions in white and sparkling wines,
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3. Enhanced aroma and flavor in red wines — preserving more of the highly-desirable fresh, fruity character,
4. Reduction in excessive astringency or color when needed.

INTERNATIONAL SPECIALTY PRODUCTS

**Polyclar® V** is a preferred option for use in wine due to its large surface area, which permits maximum efficacy. It is usually added to wine after initial clarification, during or after tartaric stabilization, or before pre-bottling filtration.

**Polyclar® VT** is a coarser grade of PVPP, optimized for addition to wine in tanks. The large particle size facilitates settling of the stabilizer, allowing the majority of the product to be left behind with the lees at racking.

*For more information on ISP Polyclar® stabilizers for wine, please contact:*

**International Specialty Products**
**Mustafa Rehmanji**
1361 Alps Rd., Wayne, NJ 07470
tel: 973/872-4403; fax: 973/628-3886
email: info@ispcorp.com
website: www.ispcorp.com

*PLEASE SEE INTERNATIONAL SPECIALTY PRODUCTS AD, PAGE 95.*

## American Tartaric Products, Inc.

For years winemakers have added oxygen to wine, it has only been in the last decade that specific tools for this task became available. Parsec has revolutionized the micro-oxygenation technology by offering a system that supplies oxygen by weight instead of volume.

When releasing a potentially dangerous gas like oxygen in a wine tank, you have to be absolutely sure that the quantity you release is precise in order to allow you to repeat it. You can find a wide range of equipment that measures oxygen dose by volume (ml). A liter of gas can be a very small quantity (at low pressure and high temperature) or very large quantity (at high pressure and low temperature). If you want to measure gas by liter, you have to refer to a specific pressure and a specific temperature.

Usually, micro-oxygenation equipment is fed by a gas cylinder and the pressure-reduction gears are not able to provide a precise pressure value. Parsec systems have taken this into account by measuring the weight of the oxygen molecule, temperature, and pressure to the micro-second with no calibrating, assuring the most accurate system available today. Systems are available from one to 120 units and are PC-compatible.

*For more information contact:*

**American Tartaric Products, Inc.**
1230 Shiloh Rd., Windsor, CA 95492
tel: 707/836-6840; fax: 707/836-6843
e-mail: atp@americantartaric.com
website: www.americantartaric.com

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*For more information and on-line ordering, please contact:*

**St. Patrick's of Texas**
1828 Fleischer Dr.
Austin, TX 78728
tel: 512/989-9727; fax: 512/989-8982
e-mail: stpats@bga.com
website: www.stpats.com

*PLEASE SEE ST. PATRICK'S OF TEXAS AD, PAGE 68.*

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## BPM Minerals

A world leader in production of Wyoming bentonite, a benchmark in the global sodium bentonite industry, BPM'S Mission Statement is: to develop, market, manufacture, and support the finest bentonite products in the world. BPM products are leaders in a range of industrial, specialty, consumer, and environmental markets worldwide. BPM was the first Wyoming bentonite producer to achieve ISO registration at all manufacturing locations. BPM is also licensed to use the API monogram labeling on its API bentonite products.

**Fining Agent:**

BPM Minerals LLC

**VITIBEN**® fining agent is made of the purest bentonite and produces superior clarity and heat stability that fine wines deserve. **VITIBEN** is designed to "fine" or remove undesirable compounds from wine and juices. These compounds include phenolics, proteins, and tannins, which are present in the fruit or result from natural enzyme reaction during processing and aging.

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4. Higher activity,
5. Longer equipment life.

**VITIBEN** fining agent is listed by the Food & Drug Administration (FDA) as Generally Recognized As Safe (GRAS). VITIBEN is certified as Kosher by the Scroll K.

Purchase **VITIBEN** directly from one of BPM Minerals LLC agents: Brenntag Pacific, Inc., 559/268-4571, or Gusmer Enterprises, 559/485-2692.

*For more information, please contact:*
**BPM Minerals**
3000 N. Sam Houston Parkway E.
Houston, TX 77032
tel: 281/871-7900; fax: 281/871-7940
e-mail: don.schulthess@halliburton.com
website: www.bentonite.com

*PLEASE SEE BPM MINERALS AD, PAGE 14.*

## KLR Machines, Inc.

KLR Machines is a distribution partner for E. Begerow GmbH & Co., the German high-quality manufacturer of depth filter media and filtration equipment.

BEGEROW

Product range comprises BECO depth filter sheets that have the least amount of ion migration coupled with the highest retention of particulate matter of any filter sheet in the wine industry. Sheet grades for wine range from K-1 at nominal 4.5 micron retention to Steril 40 through Steril 100 at nominal 0.1 micron retention.

KLR Machines has Becofloc 7 and 10 as well as SIHA Isinglass, in stock.

"Begerow customers' end products are subject to very rigorous and precisely defined quality requirements. As part of the overall manufacturing process, depth filtration has to produce safely reproducible and therefore economic results," says Begerow owner Christa Tesch. "... Begerow is geared towards producing and offering products and services of persistently outstanding quality."

*For more information, contact:*
**KLR Machines, Inc.**
350 E. Morris St., Sebastopol, CA 95472
tel: 707-823-2883
website: klrmachines.com

*PLEASE SEE KLR MACHINES AD, PAGE 19.*

## Star Filters

Star Filters has provided filtration solutions for more than 100 years. Recently, Star has focused their expertise towards the wine industry to offer four styles of filters, and filter media.

**Star compact polishing filter** B Standard features: portable, four-wheel, locking-caster design; six 47-cm precision-machined and internally ported plates for optimum sealing; large usable filtration area: 40% more per plate than a 40-cm design.

**Star DE filter** B Standard features: ten 12-inch thick DE plates, full 1.7 $ft^3$ of sludge capacity; 202 $ft^2$ of filtration area.

**Star combination filter** B Standard features: integral crossover plate facilitates two-stage filtration; ten 12" thick DE plates; ten polishing plates; mix and match plates for specific product needs.

**Portable membrane filter** (An alternative to DE filtration.) B Standard features: single-pass filtration; steam sterilizable; retention ratings of 0.2 Fm and 0.5 Fm; stationary, high process-rate models available.

**Star depth-style filter media pads** B Standard features: high flow rate and capacity; high wet tensile strength; low extractable levels, low media migration; non-toxic; available in eight micron retention ratings (0.2 Fm – 0.5 Fm).

All Star presses are available in custom sizes and manufactured with 304 stainless steel construction and polypropylene plates, to solve the difficult task of filtration. Star Filters, a division of The Hilliard Corporation, is headquartered in the beautiful Finger Lakes region of New York.

*For more information, contact:*
**Star Filters**
100 W Fourth St., Elmira, NY 14902
tel: 607/733-7121; fax: 607/737-1108
e-mail: hilliard@hilliardcorp.com
website: www.hilliardcorp.com

## Randox Laboratories USA

Randox Laboratories introduces the RX monza™, a compact, economical semi-automatic analyzer designed for winery laboratories. The Rx monza™ is an easy to use analyzer for rapid analysis of wine and grape samples. The RX monza™ comes complete with integral screen, keyboard, and printer. All tests are stored on-board and selected using labeled one-touch buttons. RX monza™, designed for straightforward operation, is robust, reliable, and requires little maintenance.

RX monza™ offers wineries a faster, more convenient means of analyzing samples compared to manual methods using spectrophotometers. Calibrations are stored on-board and calculations are carried out automatically by the analyzer, giving results in requested units. The RX monza™ has a large LCD screen, user-friendly software, and a dedicated help bar to enable an operator to complete the analysis process quickly and easily.

Randox has 25 years experience in research, development, and manufacture of a wide range of high-quality test kits. The kits include: TAS (total antioxidant status), malic acid, lactic acid, acetic acid, glucose/fructose, ammonia, and potassium.

The RX monza™ and Randox test kits offer wineries a modern innovative analyzer and high-quality test kits for a complete analysis package.

*For more information, contact:*
**Randox Laboratories USA**
4065 Oceanside Blvd., Ste. Q
Oceanside, CA 92056-5824
tel: 866/472-6369; fax: 866/726-3691
e-mail: randoxus@randox.com
website: www.randox.com

*PLEASE SEE RANDOX LABORATORIES AD, PAGE 89.*

## CUNO Filter Systems

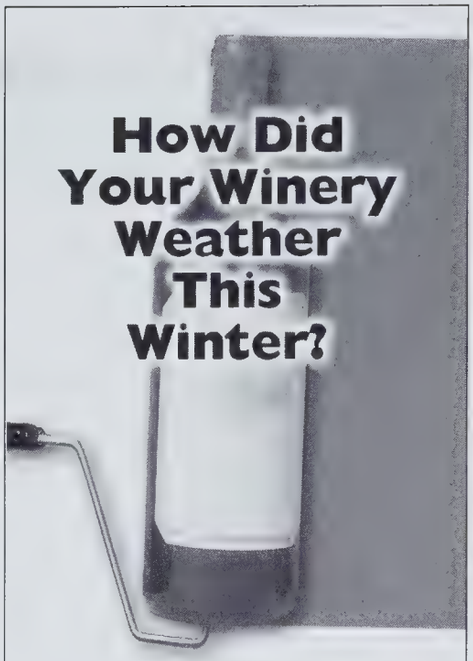
CUNO is a world leader in the design and manufacturing of a comprehensive line of filtration products and systems for clarification and final filtration of fine wines.

Innovative CUNO products for wine filtration include the first non-asbestos filter sheet (Zeta Plus®), the first multi-zoned membrane prefilter (LifeASSURE®), and the first dual-zone clarification filter cartridge (Zeta Plus Maximizer™).

CUNO has recently added to this impressive list with the BevASSURE® PES line of final membrane filters. BevASSURE PES, a new, polyethersulfone membrane final filter, combines three new technologies from CUNO to drastically improve filter throughput and drive down operating costs. A highly asymmetric microporous membrane, a patented pleating design, and a novel, patent-pending support layer construction, work in concert to deliver ultra-fast flow rates, secure spoilage organism retention, and remarkable throughput.

With over 90 years of experience and manufacturing facilities on five continents, CUNO is uniquely suited to provide solutions to wineries worldwide.

*For more information, contact:*
**CUNO Incorporated, a 3M company**
400 Research Parkway
Meriden, CT 06450
tel: 800/243-6894; fax 203/630-4530
e-mail: cohara@cuno.com
website: www.cuno.com


Spring is here. The summer visitors and the fall crush are just down the road.

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# Wine Patrol combats expensive restaurant wine

The Wine Patrol, a beloved fixture of Wine Country in the 1990s, has reemerged to lead the fight against high-priced wine in restaurants. The Wine Patrol was notorious for bringing a sense of humor to the wine business and pulling wonderful stunts like hijacking the Napa Valley Wine Train. The new WinePAL® program requires that restaurants use a portion of their wine list to present excellent wines at value prices to accommodate people who love wine but break into a sweat when ordering a $70 bottle. The ingenious WinePAL program actually deputizes consumers and gives them an active role in lowering prices.

"We're not looking to go to war on this," says Lance Cutler, Wine Patrol Commander. "In fact, we desperately want a negotiated peace. Dining in restaurants is one of society's grand pleasures, but for many there is no fine dining without good wine. When the average bottle of wine on a list costs more than your dinner, when you have to decide between wine with dinner and your kid's dentist appointment, it makes it financially difficult to enjoy your dining experience."

### *New WinePAL® program allows consumers to fight back*

For years, wine industry people have dined in restaurants where they paid $50 for a bottle of their own wine, one that they sold at the winery for $12. Granted, restaurants have plenty of expenses, and Cutler swears that he is not trying to force restaurants to change their pricing structures.

"All we want is to get some wines on the list that are interesting **and** affordable to the working man and woman." says Cutler. "There are literally hundreds of great, inexpensive wines available. Wines like Malbec and Torrontes from Argentina, Monastrell and Garnacha from Spain, Cotes du Rhône and Rousillon from France all offer great quality at value prices and could easily appear on wine lists for under $30."

The Wine Patrol thinks that every restaurant wine list should have at least one fine wine under $30 *in every category*! They think it is reasonable to insist that at least 10% of the list is under $30. They prefer that there be no corkage fee, but if there is, keep it at $10 per bottle or less. For each bottle purchased from the list, corkage for at least one bottle should be waived. The Wine Patrol would like to know who is purchasing the wine, so they know who to congratulate or who to blame. They'd like to see creativity, selection, and value in wine-by-the-glass programs.

### WinePAL® Program

The Wine Patrol is hoping consumers will take up the fight and is recruiting deputies to help spread the word to restaurants. Deputies will have identification cards depicting the Wine Patrol logo and their status as deputies. Deputies will also have cards they can leave in restaurants that direct the wine buyers to the website where they can see requirements for achieving WinePAL certification. When dining at a fine restaurant with wine prices in the stratosphere, deputies would simply leave a card when they pay the bill.

"Believe me," says Cutler, "if we get enough deputies to leave enough cards, restaurant owners will listen. We can change the way wine is sold in restaurants. If we are successful, wineries will sell more wine on-premise because their wine will be more affordable."

People who want to enlist as Wine Patrol deputies or who are looking for more information on the Wine Patrol and WinePAL program are invited to visit **www.winepatrol.com.** ■

## CALENDAR

**JUNE 26–30**
**ASEV 57TH ANNUAL MEETING**
**SACRAMENTO, CA**

See ***PWV*** Calendar, March/April 2006, page 81 for details.

**JUNE 29, 9AM–4PM**
**GRAPEVINE CLEAN PLANT WORKSHOP**
**UC DAVIS**

The California Grapevine Registration & Certification (R&C) program is undergoing a review of regulations that serve both California grape nurseries and grape growers. This workshop, coordinated by Deborah Golino (Director of Foundation Plant Services [FPS]), will introduce attendees to some technical issues to be considered as the revised regulations are developed by the California Department of Food and Agriculture (CDFA).

Speakers from UC Davis who are currently working to improve the California R&C program include: Dr. Adib Rowhani, Plant Pathologist (FPS), will discuss the uses of different grapevine testing strategies in clean stock programs and for samples from field sites. Dr. Christian Leutenegger, Director, Lucy Whittier Molecular & Diagnostic Core Facility (School of Veterinary Medicine), will report progress in the use of real-time PCR for grapevine virus testing which may greatly reduce the turn-around time for testing and improve accuracy of results. David Godfrey (CDFA), will outline the process necessary for updating the Grapevine R&C Program and share his experience with this and similar programs. Dr. Andy Walker, Dept. of Viticulture & Enology, UC Davis, will discuss techniques which can be used for this key step in clean plant programs. Tom Burr, Professor of Plant Pathology (Cornell University, NY), will discuss strategies to controll crown gall in nursery stock. Jerry Uyemoto, USDA-ARS Research Plant Pathologist (Davis), will review the biology of some new agents which he has discovered.

There will be panel discussion of the benefits and difficulties of field diagnosis using laboratory testing. This course is sponsored by the California Fruit Tree, Nut Tree and Grapevine Improvement Board (IAB) that is underwriting a large portion of seminar cost ($49 includes lunch and course materials.) PCA credit pending.

To request more information or enroll, call: 800/752-0881, from Davis or Woodland call: 530/757-8777, email: aginfo@unexmail.ucdavis.edu or visit www.extension.ucdavis.edu/winemaking.

**ZINPOSIUM**
**MERITAGE HOTEL, NAPA, CA**

See ***PWV*** Calendar, March/April 2006, page 81 for details.

**Calendar continued on page 89**

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Comprehensive theory and practice of major chemical analyses of grape and wine.
**115pp—$110.00**

**Cooperage for Winemakers**
Geoffrey Schahinger, Bryce Rankine
Manual on construction, maintenance, and use of oak barrels. User-friendly, informative text and photos **112pp—$25.00**

**Diseases and Pests**
edited by Nicholas, Margarey, Watchel
Dept. of Primary Industries & Resources, South Australia **106pp—$40.00**

**Diseases, Pests, & Grape Disorders Field Guide**
Magarey, MacGregor, Wachtel, & Kelly
Sturdy, laminated, pocket-sized guide containing more than 350 color photos with short, easily-read descriptions of most diseases, pests, and disorders found in vineyards.
**107pp—$27.50**

**Flowering and Fruitset in Grapevines**
Peter May
How weather affects fruitset. Published by Phylloxera and Grape Industry Board of South Australia. **120pp—$28.50**

**Growing Quality Grapes to Winery Specifications** by M. Kristic, G. Moulds, B. Panagiotopoulos, & S. West
Quality measurement and management options for grapegrowers. **103pp—$32.50**

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# Critical habitat "banks" protect endangered species

BY Renée L. Robin, Lilly Santaniello

Sonoma County vineyards and vintners are breathing a sigh of relief over a decision by the U.S. Fish & Wildlife Service (the Service) to refrain from designating as much as 74,000 acres in Sonoma County as critical habitat for the endangered California tiger salamander.

In December, 2005, the Service announced that it has adopted a "consensus-driven solution" referred to as the "Santa Rosa Plain Conservation Strategy." The Service called on the Secretary of the Interior's discretionary authority under the Endangered Species Act to adopt this alternative program as a means of complying with a court-mandated deadline to complete a critical habitat rule in this region by December 1, 2005.

The Santa Rosa Plain Conservation Strategy is but one example of a recent growing trend towards what the Service calls "collaborative conservation." The focus of collaborative conservation is protection of endangered species on privately owned land through cooperative ventures between landowners, federal, state, and local agencies, non-profit conservation groups, and Indian tribes.

For example, as part of the collaborative conservation strategy, the Kendall-Jackson ranch operations in Santa Barbara recently agreed to a number of California tiger salamander conservation measures on its property in exchange for exclusion from the critical habitat designation rule published in 2004.

As a result of this effort, Kendall-Jackson Wine Estates Ltd. was honored at a 2005 White House Conference on cooperative conservation initiated by President George Bush in order to promote his recent executive order, "Facilitation of Cooperative Conservation," which encourages cooperative conservation between landowners, government agencies, and other groups.

The California tiger salamander is found throughout the Central Valley, the Sierra Nevada Foothills, and the Coastal region from San Francisco to Santa Barbara. Wineries and other agricultural land owners may find that they can also implement a collaborative approach to protecting this species taken in Santa Barbara and Sonoma.

This type of collaborative process is not limited to the tiger salamander and is applicable to any regional negotiation with the Service on "critical habitat" designations. This approach can be applied even after litigation has been instituted.

In March 2006, an agreement was reached between the Service and the California building industry and other commercial groups regarding a challenge to the Service's designation of critical habitat for 27 species covering 382,000 acres in San Mateo and Santa Clara Counties.

Under the settlement agreement, the Service will re-examine its designation of 288,000 acres of critical habitat, engaging in a more extensive analysis of possible economic impacts of the designation. In return, business groups dismissed their claims regarding habitat for 25% of the acreage involved. Although settlement of this suit has been successful, perhaps litigation could have been avoided altogether if the collaborative approach had been initiated earlier in this critical habitat designation process.

The Santa Rosa Plain Conservation Strategy exemplifies how this type of collaborative process can benefit all interests involved, from landowners to regulatory officials at all levels of government. The Service's initial proposal in August 2005 to designate more than 74,000 acres was incrementally revised over a five-month period to 17,000 acres by mid-November.

Factors contributing to the decision by the Service to withhold formal designation were public comments received over a three-month period and economic analyses projecting staggering losses to the local economy as a result of the designation. Losses were projected to be as much as $336 million over 20 years.

After the additional public input was combined with a successful local collaborative process to outline a strategy for protecting key segments of the habitat, the decision to formally designate the habitat was withheld.

The new collaborative Sonoma County plan protects the local salamander population along with four endangered plant species in the Santa Rosa Plain. A 21-month negotiation was held with environmental and development interests, along with local, state, and federal officials. Benchmarks have been set to ensure plan implementation.

For example, five local jurisdictions are committed to vote on the actions to implement it within two years. The strategy establishes eight conservation areas each totaling between 3,450 and 4,250 acres outside the cities of Santa Rosa, Cotati, Rohnert Park, and Windsor. These designated areas will become mitigation "banks" for impacts from nearby development.

The designated lands may also retain their existing land uses and zoning. A mitigation ratio for new development projects has been identified. Projects within 1.3 miles of wetland and vernal pool breeding sites will be required to provide two acres of conservation for each acre of development impact.

The overall goal of the Plan — to mitigate the adverse effects of future development while ensuring recovery of the species — seems to have been embraced by most parties. The Center for Biological Diversity, the non-profit organization that has taken the lead role in advocating for listing of both the species and habitat, has criticized the Plan, but has not yet announced whether it will challenge this decision by the Service.

If the entire 74,000 acre area had been designated as critical habitat by the Service, requirements for pre-project consultation would have extended

not only to harm to the species itself, but also to any harm to its designated habitat. Because the salamander breeds in seasonal wetlands and vernal pools in wet seasons, and in grasslands and burrows within 1.3 miles of its breeding areas, the number of projects subject to mandatory consultation with the Service would have been very large. This would have impacted the majority of agricultural operations in Sonoma County, especially those using irrigation and stock ponds.

Before 2004, the California tiger salamander (*Ambystoma californiense*) was listed as a threatened species in both Sonoma and Santa Barbara counties, but evidence of a more extensive range and habitat needs resulted in a statewide listing of this species as threatened. This status prohibits any intentional harm or harassment of the species without a consultation with, and permit from, the Service.

The full range of farming activities, road construction, and home-building can result in impacts to this species, and harm to the species can result in civil and criminal penalties. The requirement for consultation with the Service (16 U.S.C. § 1539(b) before these activities can proceed also applies to federal and state agencies issuing permits for actions such as the filling of wetlands. New vineyard development activities such as grading, construction of drainage ditches and irrigation ponds, and modification of wetlands fall under the Service's jurisdiction for incidental take permits.

After engaging in consultation, the Service may issue a permit for the "incidental take" of the species so long as conditions of the permit, including mitigation requirements, are met. The Service may issue permits for "take" of endangered species in certain circumstances. Section 10 (a)(1)(B) of the Federal Endangered Species Act (16 USC 1531 et seq.) allows otherwise prohibited "take" that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity.

To receive a permit, an applicant must fulfill certain requirements, including preparation of a conservation plan. Typically, potential impacts are mitigated through modified practices, setbacks, and land conservation. Permit conditions can be satisfied, in some instances, by preservation of similar off-site species habitat through contribution to a mitigation bank, where critical habitat is identified for this purpose. This type of off-site mitigation is a key element of the Santa Rosa Plain Conservation Strategy.

Owners of vineyards and related agricultural operations have reason to be optimistic that the Santa Rosa Plain Conservation Strategy will minimize immediate new regulatory burdens. Additionally, the Service's willingness to engage in this type of environmental conflict resolution process could serve as a model for other regions of California where similar critical-habitat issues are actively under dispute.

A complete discussion of the Santa Rosa Plain Conservation Strategy can be found at www.fws.gov/sacramento/es/santa_rosa_conservation.html. ■

*Renée Robin is Of Counsel and a member of the Stoel Rives Winery & Vineyard Management team in San Francisco, CA. Her practice encompasses a wide range of land use, natural resources matters, agriculture and water resources matters, with an emphasis on sustainable development. Lilly Santaniello is an associate at Stoel Rives specializing in environmental compliance and natural resource issues. For questions regarding this column, contact Renée at rlrobin@stoel.com or 415/617-8908.*

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## *Do corks breathe?*

**Continued from page 73**

What the threshold value is may well vary for individual wines — which seems to be the case for the current low OTR screw caps. This level of oxygen ingress seems to be below the desired value for many wines.

### *Perfect closure*

Theoretically for those subscribing to the anaerobic belief of bottle age, the perfect closure is the ampoule. By now, hopefully, many winemakers can subscribe to the fact that what may be required is an imperfect closure, as far as permeability goes. But how imperfect?

The implications of striving for a closure to deliver as close to anoxic conditions as possible for bottle ageing, raises a number of interesting scenarios. The implications are significant, and require some thought beyond simply removing TCA.

The general conception that corks closest to anoxia are the best corks should be questioned.[6] It may well be that wines sealed with these corks were the ones exhibiting some reduction character.[1] Given two bottles of the same wine, the one just beyond the anoxic end may be preferred.

The assumption that "good" corks mimic screw caps is just that, an assumption, which this author does not share. Sulfide in wine has traditionally been considered a fault because of the detrimental sensory effects on the wine. Which is why winemakers are trained to remove these with copper fining. Unless winemakers are about to change this view, any incidence of SLO under cork should be considered a fault as it should be for screw cap.

**Assuming a wine has been cleaned up meticulously pre-bottling, how long would it take for SLO to show up if it was going to?**

From one to 12 months. The reason behind the variable time issue we won't discuss here for space constraints. The literature suggests a time frame of up to 24 months, but in practice, it seems to eventuate faster than this.[10] It would be a reasonably safe generalization to say that if it has not occurred within 12 months, it is unlikely to.

**If it does occur, is it likely to go away?**

Yes ... and no. No in the short term (several years), and yes, long-term (many years). Long-aged screw cap wines will have genuine cases where the winemaker does see the SLO character moderate.

**Is it the wine or the closure that is at fault in the generation of SLO?**

There have been many reports where categorical statements have laid the blame entirely on the wine(maker), that it is not the closure's fault. It could be considered the fault of the wine(maker) if wine was consistently produced and guaranteed free of complex sulfides or $SO_2$ ($SO_3^=$). Neither of these options is particularly practical.

### *Conclusion*

Production of complex sulfides in part, at least, is largely beyond a winemaker's control. Further, they are not detectable by normal copper(II) fining trials, nor easily removed.

If the other view is adopted and the conclusion accepted that the SLO is generated by a lack of oxygen to mitigate the inevitable reaction between $SO_3^=$ and disulfides, then blame should fall on the impermeability of the closure. By raising the OTR to mimic that of cork, the problem will diminish markedly, if not completely.

There is a further possible pathway to thiol accumulation which has not been covered above. Thioacetate (ethyl and methyl) production has been noted in the fermentation products of wines.[7,8] Thioacetate (or thio esters) is also not treatable by Cu(II) fining and has the ability to hydrolyze to its respective thiols. Once hydrolyzed, the thiol products are indistinguishable from the disulfide cleavage process, and the end result is the same.

Thioacetate production has generally, although not exclusively,[9] been linked to significant elemental S residues in fermentation.[7,8] In some cases of post-bottling SLO, there will be wines almost certainly suffering from both causes of thiol accumulation. Only a specific chemical

analysis of each wine's sulfide profile would provide a definitive answer as to the prevalent thiol precursors.

In a nutshell, the screw cap impermeability is encouraging a specific, unfortunate, post-bottling sulfide reaction (thiol accumulation), while cork's permeability discourages it. ■

*The author wishes to thank Dr. Kilmartin (Auckland University, Wine Chemistry Dept), Dr. Bendall (Fonterra) and Roger Boulton, Professor of Enology and Chemical Engineering, UC Davis for helpful discussions during preparation of this text.*

*Alan Limmer has a PhD in chemistry and 20 years experience in winemaking. He has been a director of the New Zealand Winegrowers for 12 years and is currently Chair of that organization's research program. In 2005, he was elected a Fellow of the New Zealand Institute of Chemistry. Alan is owner/winemaker of Stonecroft Wines, Hastings, North Island, New Zealand.*

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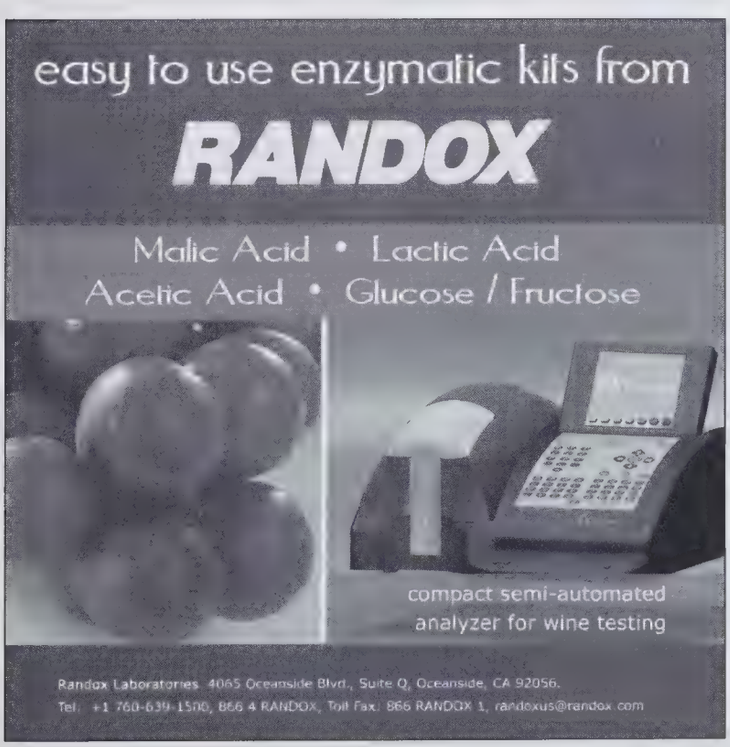
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SMART VITICULTURE *by Dr. Richard Smart*

# A cool, Cool Climate Symposium

In February 2006, I attended my sixth International Cool Climate Symposium for Viticulture and Enology, held this year in Christchurch, New Zealand. Only a few of us have attended all six, including Don Neel (publisher of *PWV*), Scott Henry (Umpqua, Oregon) of the trellis fame, and Jon Leighton of the United Kingdom (who was on his honeymoon the last time the symposium was held in New Zealand).

The symposium series began in Corvallis, Oregon, in 1984; followed by Auckland, NZ, 1988; Geisenheim, Germany, 1992; Rochester, NY, 1996; Melbourne, Australia, 2000; and Christchurch, 2006. The symposium was as good as all its predecessors and was enjoyed by over 500 attendees.

### *New Zealand and the Symposium*

There were many excellent papers presented, and full compliments must be given to the local organizers for their ability to attract such high caliber keynote speakers and poster papers. There was also an excellent social program.

The New Zealand wine industry has grown substantially since the 1988 Conference in Auckland. In the last 18 years, New Zealand's vineyard area has increased from 10,750 acres to 55,000 acres, and the number of wineries has increased from 112 to more than 520. Sauvignon Blanc is the most important variety with 18,750 acres, and Pinot Noir the most important red wine variety. Wine exports from New Zealand have increased 36 fold to around $440 million NZ in 2005 with the possibility to reach $1 billion NZ by 2010.

Much of this growth can be attributed to the international success of Sauvignon Blanc, particularly from the Marlborough region. This region has grown dramatically since the 1980s, and now the Wairau Valley is almost completely filled with vineyards.

New Zealand wine growers and enologists have always been resourceful and used good technologies. Witness, for example, the screw cap revolution, which is dramatically affecting the wine world (though noticeably less so in the U.S., as yet). This new development received a lot of impetus from New Zealand winemaking companies.

### *Sauvignon Blanc research*

The audience at the symposium rightfully admired how the New Zealand wine industry has organized its research program around Sauvignon Blanc. Vintners and growers have committed substantial funds to a total "grape to glass" research program. The project is multi-disciplinary, and several cooperating institutions are involved.

New buildings have been constructed at the Marlborough Research Centre in the past two years, and new staff appointed. The staff includes viticulturists, enologists, and sensory evaluation specialists. Mike Trought leads the centre's research group and gave an excellent presentation to lead off keynote papers at the symposium.

One of the centre's first studies was conducted in five commercial vineyards in the Marlborough region in 2004. Differences in pruning levels were compared, and the study found that vines pruned to two canes flowered before those pruned to four canes. These differences continued through to harvest and the study will follow through to winemaking. Other studies, concentrating on the effects of local soil types on root growth and vine vigor, have found that gravel layers encourage root density, but deeper topsoil encourages vigor.

Aroma compounds contributing to Sauvignon Blanc are well understood as was demonstrated in Dr. Laura Nicolau's paper (University of Auckland). The Auckland group is aiming to combine chemical and sensory analysis to define the innate flavors in New Zealand Sauvignon Blancs. Many of these studies have been made in the Bordeaux laboratory of Dr. Denis Dubourdieu. Collaborators in this laboratory have established facts, such as, for example, that water and nitrogen stress reduce flavor precursors for Sauvignon Blanc.

I really admire this coordinated project and think it is a model for other regions and countries to follow. How about instituting Cabernet Sauvignon studies in Napa Valley, or Syrah studies in Australia?

### *Other topics*

Several presentations addressed the impact of climate change, which was also mentioned by several keynote speakers, including me. Leann Webb (University of Melbourne), presented results from her study of the impact of temperature increases between 0.5 and 3.1°F would have in many viticultural areas. Such changes are anticipated by the year 2030.

By 2070, the temperature increase in Australia and likely worldwide is projected to be from 1.4 to 9.4°F. Webb has been able to calculate the effect of temperature increases on wine quality between regions on quality, and so, using prices cur-

**Fabulous five, who have attended all six Cool Climate Symposia (left to right): Dr. David Heatherbell, Lincoln University; Scott Henry, Henry Estate, Oregon, USA and creator of the trellising system that bears his name; Dr. Richard Smart, now of Tasmania, NZ Government Viticulturist during the 1980s; John Leighton, of UK, formerly owner of Valley Vineyards near Reading; Don Neel, publisher and editor *Practical Winery & Vineyard* magazine, of San Rafael, California. (Photo by Terry Dunleavy, New Zealand winegrower.)**

rently paid for grapes, she can predict the cost-impact of climate change. Climate models also indicate an increased irrigation requirement.

Joel Rochard, from ITV (Epernay in France), has studied the impact of climate change in Europe on vine phenology. Records were examined from monasteries in the Middle Ages up to the present regarding date of harvest. The harvest date appears to have changed particularly over the last 15 years, which does indicate climate change as a result of human activity.

One of the first effects of climate change predicted by the experts is a change in insect distribution. W. Kast (Weinsberg in Germany), notes that temperatures have significantly increased in the last 50 years, including changes to winter, spring, and summer temperatures compounded by changes in summer and autumn rainfall. Temperature changes between 2 and 5.5°C were recorded. These changes have been found to produce conditions in Germany similar to those in the Mediterranean region.

The cicada *Hyalestes obsoletus* is a well-known insect vector for phytoplasma disease which has now moved into Southern Germany. This disease is now found in Germany, where it is called Bois noir (Black wood). Kast reports that within two years, 30% of the vines in one vineyard showed symptoms and had no yield, and in the following year 40 vineyards in the region were found to be affected. The disease is spreading extremely rapidly.

Marlborough research has also investigated the effects of berry size on Sauvignon Blanc flavors. This is because methoxypyrazines are mostly in the skin and seeds. Different berry sizes were produced by different irrigation treatments and selection of vines naturally varying in vigor. The researchers were able to generate large changes in berry weight, from 1.1 to 1.67 grams. However, large variation in berry weight and berry diameter caused very little difference in the skin weight to berry weight ratio (which varied from .083 to .090).

The seed weight to berry weight varied from .025 to 2.03 grams. The studies show that it's likely that berry weight has little impact on the concentration of these compounds in resulting must and wines.

Researchers from the University of Rioja in Spain have found that a vineyard scorecard was a powerful and reliable method to assess winegrapes in a vineyard. This scorecard appears similar to one that I developed, based on physiological and microclimate parameters. The Spanish scorecard was evaluated on the Tempranillo variety for 30 vineyards and correlated with wine quality.

One of the keynote papers discussing "terroir," was presented by Professor Warren Moran (University of Auckland). Moran spoke about crafting terroir, that is, the concept is man-made and multi-faceted. He demonstrates from a historical perspective how the concept of terroir has evolved in Europe.

Moran states emphatically that terroir has many components, including those of plant growing, winemaking, territorial, and identity, plus promotional and legal aspects. He then went on to define implications of each of these facets or elements of terroir. He concludes his paper by showing that, despite just 40 short years of existence, New Zealand's modern wine industry is developing concepts of terroir as the industry evolves. This is, at the moment, resulting in specialization of varieties by regions. Sauvignon Blanc in Marlborough is a good example.

### *Conclusion*

I have enjoyed all six Cool Climate Viticulture and Enology Symposia. They bring together a truly international audience, although it is primarily New World rather than Old World in composition. The next conference will be held in the Pacific Northwest U.S. in 2010.

It is interesting to review the changes that have taken place over the period that these conferences have been held. One point that was particularly obvious to me is the reduced emphasis on canopy management at the 2006 symposium compared to the first few. Does this indicate a downturn in canopy management research around the world? Sadly, I think this may be the case. Gladly however, mechanization research is proceeding. ■

*Dr. Richard Smart, "the flying vine-doctor," is an international viticultural consultant based in Launceston, Tasmania, in Australia. He can be contacted by e-mail: vinedoctor@compuserve.com. Read about Dr. Smart's business, including his consulting schedule, educational wine tours, and seminars, at his home page http://www.smartvit.com.au. He visits America frequently and his consulting schedule is arranged by Vinquiry in Windsor, CA, tel: 707/ 838-6312 and http://www.vinquiry.com.*

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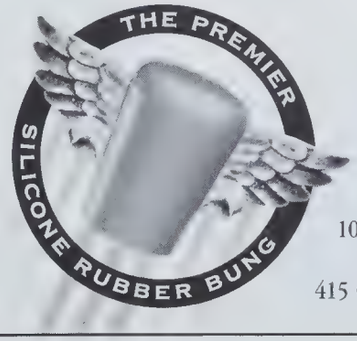

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PERSONNEL POINT OF VIEW *by Mimi Lemanski*

# You say tomato, I say tomate ...

As a consultant who trains employees and management in both English and Spanish, I have observed that perceptions from the "American" and "Latino" perspective often are quite different. Being able to communicate effectively, whether you are training, motivating, or just working together is key to the success of anyone in business.

In order to make this happen with Latino employees — people whose families originated in Latin America — it is necessary to understand a bit more of how they think and work. Only when this happens can we integrate a diverse workforce, empowering employees to understand the differences and grow as we all understand what we have in common. In this column, I'd like to address this cross-cultural dilemma, using some broad generalizations and observations based on my own experience of living in various cultures and training here in the U.S. Let me share a personal story.

Recently, I was listening to Rosanna, a fabulous singer from the Canary Islands, I commented to my husband how profound the lyrics were and how the imagery was so poignant, and he, being curious, asked the obvious, "What is she saying?" I tried to translate the meaning. If I had been drawing, my translation would have looked like a stick figure instead of the rich Rubenesque tableau that Rosanna was painting with her words.

I simply couldn't translate the essence of her song into English. "I can't live without you, how do you live with yourself?" My husband, the patient one, looked over and raised an eyebrow. Then I tried going line-by-line, which sounded like "burning skin and butterflies making waves, oh baby I can't live without you." I could translate the words, but none of it sounded like the rich meaning I was getting from the song.

Why do I talk about Latin music in a human resource column? As the example above illustrates, it may be easy to translate words from one language to another; however, it is very difficult to try to communicate understanding from one culture to another.

### *Communicating despite the difficulties*

But we also know that effective communication is the cornerstone that allows each of us to understand one another. In running any business, particularly in the wine industry, where Latinos play such a critical role, it is vital to have clear communication in order to meet time-sensitive demands of the business.

In addition, how do we motivate someone from a different culture, or how do make him/her an integral part of the team? What about training? If we don't understand how a different culture learns, how effective can we be?

When managers understand the Latino culture and how Latinos fit into the American business model, they build loyalty among employees and goodwill in communities, which ultimately result in meeting production and financial goals.

I love my role as an English/Spanish trainer on management, cultural adjustment, and harassment issues. I relish standing in front of a group of English- and Spanish-speaking employees, straddling two cultures, and trying to make sure that the **meaning** of what is said in either language is understood contextually by both groups. It is easier for me to do this, because I was born and raised in Mexico, but to try to get these two groups to communicate effectively amongst themselves is a bit more of a challenge.

After all, the usual cornerstones of communication — tone, body language, and words — are not necessarily interpreted the same way by the two cultures. There's no reason to expect that there should be the same understanding, because most people have not had the opportunity to move out of their culture into another — whether they are American or Latino.

Even when Latinos come to the U.S., like all the immigrants that have come before them, they tend to stay in communities of other Latinos and frequent known restaurants and stores within that neighborhood. Intercultural relations remain at arm's length.

### *Improving communication*

How do we improve communication between these two cultures? Often, our first reaction either as an American or a Latino is to say, "Well, why can't they understand how we do things?" English speakers think it is easy enough to fit in. You just read whatever information is necessary to get the job done or ask how to do it, and then certainly you will get the hang of it.

But it is not that easy from a Latino perspective. Often, Latinos do not speak or understand English. Even when there is some understanding, they may tend to nod and say "yes, yes" when in reality the complete meaning is not understood. So what **can** we do?

Let's think about how the cultures differ day to day. We tend to make assumptions about how employees think and act based on our "American culture." What is American culture? What comes first to mind when you think of sports? Football? Baseball? What about TV shows? *Deal or No Deal*? The *Sopranos*? What about the weekend? Little League games? A ski trip? For Latino employees, the answers to these questions are often radically different. What sports do they think about? The World Cup? TV shows? Usually those on Spanish channels. What do they do on the weekend? Spend Sunday in the park with all the family. These are just some of the daily differences.

On a more internal, less obvious level there are differences in the assumptions our two cultures make about how employees view their jobs and career. In the American culture, we believe that we can choose our jobs based on what we're interested in or capable of doing: barring personal issues, we feel that we have the freedom to move between jobs as long as our goals of success are met. We are commanders of our own fate. Success is ultimately measured by how well we do in whatever area we choose to focus.

The Latino culture, on the other hand, is rooted in a complex world, that is steeped in a long history of blended, conquered societies. Fate is something to be accepted, not controlled. Relationships between extended family members can be quite complex, and the freedom to function as an individ-

ual is not always possible. Freedom of mobility is not always perceived as a given.

The simple word "respect" can provide a glimpse of how different two cultures can be. RESPECT, in Spanish, RESPETO. In both the English and Spanish employee and management trainings that we conduct in the wine industry, when we ask the question: "How do you want to be treated in the work place?" The one answer that inevitably surfaces is "with respect."

Such a simple word, but oh, so complex in its meaning. Respect, American style is a value based on fairness and equality, developed talent — be it physical or mental — productivity, and/or success.

Latinos, and Mexicans in particular, treat respect very differently. Being physically fit, talented, or having great personal accomplishments are not as important as the kind of person you are. XWhat elements are important?X The most important elements of respeto are loyalty, generosity, respectfulness, and being courteous and kind.

Contrary to the American value of success in business or a profession, a person's soul and character are ultimately more important than working long hours or having a finely-honed skill. Respect is ultimately all about being able to balance living a good life and working, with more emphasis on the quality of life than the quantity of work produced. There are some wonderful Latino idioms and expressions that capture these sentiments.

As you can understand, it's a challenge for Latinos to adjust to the American concept that work is of utmost importance. Many Latino employees are gradually adapting to the American way of life, but they still long for the lifestyle they used to have, where work and life were more balanced.

***How do we try to bridge the cultural gap?***

It really isn't as complicated as it may seem. Managers must have a keen awareness that the cultures are different and a willingness to be more observant and less judgmental. This is a tall order in a stress-filled work environment, but necessary in order to effectively communicate, train, and motivate Latino employees.

Performance expectations do not need to be any different. The key is in knowing how to deliver them so that they are clearly understood. This may take adjusting of our approach. It may require a greater investment of a manager's time to understand **how** Latino employees are doing, not necessarily just at work, but by taking a genuine interest in their families as well.

The Latino culture is inclusive, so that gestures like an annual family picnic or barbeque, in which everyone partakes, is a valuable investment for building better relationships with Latino employees. Taking the time to say to someone, "This is a job well done," makes a huge statement about respeto.

Noticing how an employee motivates others to do the job is also worth commending and learning from, since that is not only getting the job done, but also meeting the need to be respected. The key is to go back to the question, "How would I like to be treated?" Treating others the way you'd like to be

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treated is called the "Golden Rule." In cross-cultural relations, you need to go a bit farther to ask yourself, "How would **they** like to be treated?" This is the "Platinum Rule."

I will leave you with one last Latin American song that I was listening to recently. It goes something like this … "Aunque las cosas hacen falta, dejen me tranquilo en mi cama remojándome los pies. Estoy ajustito con la vida, dentro de mi cuerpo y alma." The literal translation is something like this: "Even though there are things that are lacking in my life, let me be in my bed, soaking my feet. I fit closely with life, my body and soul." It doesn't make much sense in English, but when you add the cultural meaning of the word "ajustito," the song is really about "life being a perfect fit, regardless of the shortcomings," which is a beautiful sentiment.

Why did I start with music as means of talking about communication? Because music, like poetry, reflects the depth of a culture's soul. ■

*Mimi Lemanski is an Associate with The Personnel Perspective, a human resources consulting, training and recruiting firm in Santa Rosa, CA. Mimi has extensive and broad-based experience as a Spanish/English and English/Spanish bi-lingual and bi-cultural trainer, translator, and interpreter. She can be reached at 707/576-7653.*

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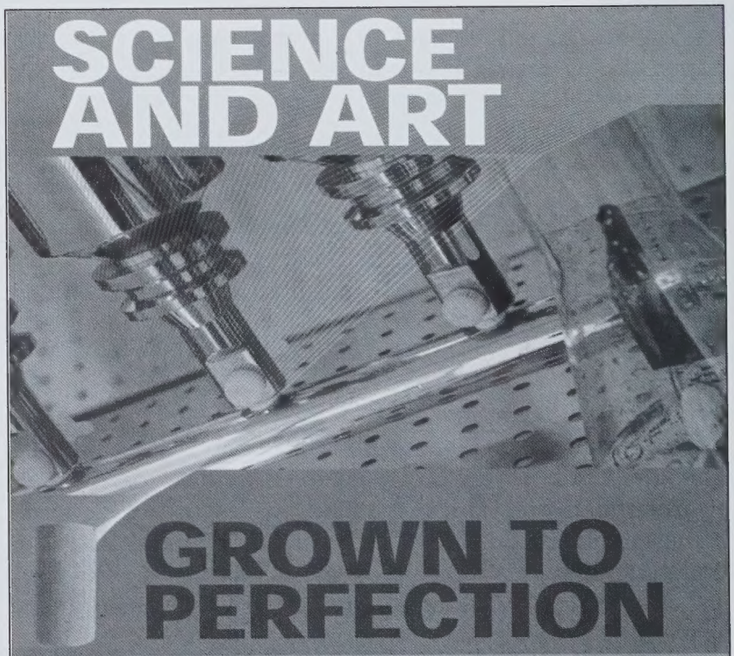


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